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TM 11-264

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

Hq-CAP-Comm

**RADIO SET
AN/GRC-26**

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TM 11-264

RADIO SET AN/GRC-26



DEPARTMENT OF THE ARMY

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WARNING

HIGH VOLTAGE
IS USED IN THE OPERATION OF THIS EQUIPMENT

DEATH ON CONTACT
MAY RESULT IF PERSONNEL FAIL TO OBSERVE SAFETY PRECAUTIONS

Be careful not to contact high-voltage connections or 115-volt input connections when working on or near this equipment. When working inside the equipment, after the power has been turned off, always short-circuit the high-voltage capacitors.

Extremely high radio-frequency voltages may develop on the antenna of this radio set. Do not touch the antenna, feed-in wires, or antenna insulators while the set is turned on. Radio-frequency burns and death may result.

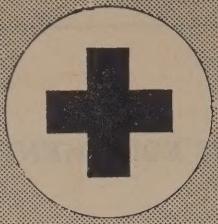
Do not add gasoline to the fuel tank of Power Unit PE-95-G when the transmitter is on. Radio-frequency voltage may cause a spark which will result in an explosion. Turn off the transmitter and keep it off until refueling is finished.

EXTREMELY DANGEROUS POTENTIALS

exist in the following units:

RADIO TRANSMITTER T-213/GRC-26

POWER UNIT PE-95-G.



First Aid for Electric Shock

RESCUE.

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim. An ax may be used to cut the high-voltage wire. Use extreme caution to avoid the resulting electric flash.

SYMPTOMS.

a. Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breath center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

b. The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

TREATMENT.

a. Start artificial respiration immediately. At the same time send for a medical officer, if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. *In this case only*, remove the victim to another location, but no farther than

is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. If the method of transportation prohibits the use of the Shaeffer prone pressure method, other methods of resuscitation may be used. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth-to-mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.

b. Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing.

c. Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open, with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

d. If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

e. The resuscitating operator should straddle the victim's thighs, or one leg, in such manner that:

(1) the operator's arms and thighs will be vertical while applying pressure on the small of the victim's back;

(2) the operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib;

(3) the heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim;

(4) the operator's elbows are straight and locked.

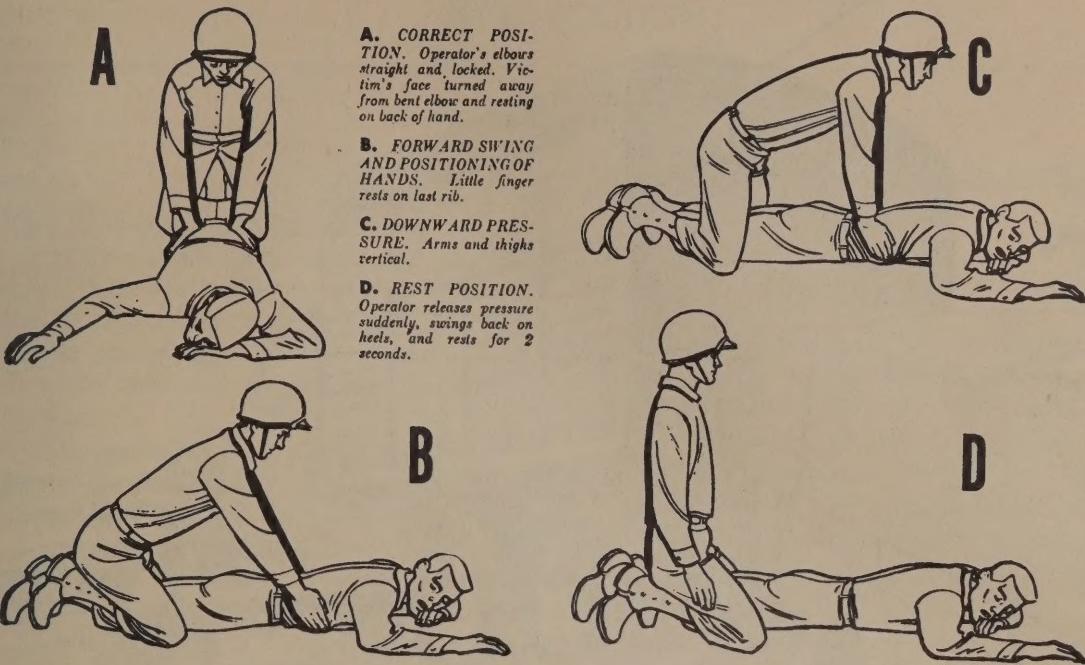
f. The resuscitation procedure is as follows:

(1) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(2) Swing back, suddenly releasing pressure, and sit on the heels.

(3) After 2 seconds rest, swing forward again, positioning the hands exactly as before, and apply pressure for another second.

g. The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4



A. CORRECT POSITION. Operator's elbows straight and locked. Victim's face turned away from bent elbow and resting on back of hand.

B. FORWARD SWING AND POSITIONING OF HANDS. Little finger rests on last rib.

C. DOWNWARD PRESSURE. Arms and thighs vertical.

D. REST POSITION. Operator releases pressure suddenly, swings back on heels, and rests for 2 seconds.

seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence of the cycle, he should count the seconds aloud, speaking distinctly and counting evenly in thousands. Example: one thousand and one, one thousand and two, etc.

h. Artificial respiration should be continued until the victim regains normal breathing or is pronounced dead by a medical officer. Since it may be necessary to continue resuscitation for several hours, relief operators should be used if available.

RELIEVING OPERATOR.

The relief operator kneels beside the operator and follows him through several complete cycles. When the relief operator is sure he has the correct rhythm, he places his hands on the operator's hands without applying pressure. This indicates that he is ready to take over. On the backward swing, the operator moves and the relief operator takes his position. The relieved operator follows through several complete cycles to be sure that the new operator has the correct rhythm. He remains alert to take over instantly if the new operator falters or hesitates on the cycle.

STIMULANTS.

a. If an inhalant stimulant is used, such as aro-

matic spirits of ammonia, the individual administering the stimulant should first test it himself to see how close he can hold the inhalant to his own nostril for comfortable breathing. Be sure that the inhalant is not held any closer to the victim's nostrils, and then for only 1 or 2 seconds every minute.

b. After the victim has regained consciousness, he may be given hot coffee, hot tea, or a glass of water containing $\frac{1}{2}$ teaspoon of aromatic spirits of ammonia. *Do not give any liquids to an unconscious victim.*

CAUTIONS.

a. After the victim revives, keep him LYING QUIETLY. Any injury a person may have received may cause a condition of shock. Shock is present if the victim is pale and has a cold sweat, his pulse is weak and rapid, and his breathing is short and gasping.

b. Keep the victim lying flat on his back, with his head lower than the rest of his body and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

c. A resuscitated victim must be watched carefully as he may suddenly stop breathing. *Never leave a resuscitated person alone until it is CERTAIN that he is fully conscious and breathing normally.*



Figure 1. Radio Set AN/GRC-26.

CHAPTER I

INTRODUCTION

Section I. GENERAL

I. Scope

a. This technical manual contains instructions for the installation, operation, maintenance, and repair of Radio Set AN/GRC-26. In addition to these instructions there are three appendixes covering a list of references, an identification table of parts, and a table of components.

b. Official nomenclature followed by (*) is used to indicate all models of a particular item of equipment discussed in this book. Thus, Dual Diversity Converter CV-31(*)/TRA-7 represents Dual Diversity CV-31/TRA-7, CV-31A/TRA-7, and CV-31B/TRA-7. Control Box C-345(*)/MRC-2 represents Control Boxes C-345/MRC-2 and C-345A/MRC-2. Control Unit C-292(*)/TRA-7 represents Control Units C-292/TRA-7, C-292A/TRA-7, and C-292B/TRA-7. Frequency Shift Exciter O-39(*)/TRA-7 represents Frequency Shift

Exciters O-39/TRA-7, O-39A/TRA-7, and O-39B/TRA-7.

2. Forms and Records

The following standard forms will be used for reporting unsatisfactory conditions of matériel and equipment, or improper preservation, packaging, packing, marking, loading, stowage, or handling thereof.

a. DD Form 6, Report of Damaged or Improper Shipment (Reports Control Symbols CS GLD-66) will be filled out and forwarded as prescribed in SR 745-45-5.

b. DA AGO Form 468, Unsatisfactory Equipment Report (Reports Control Symbol CS GLD-247), will be filled out and forwarded to the Chief Signal Officer as prescribed in SR 700-45-5.

c. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Radio Set AN/GRC-26 consists of a transportable assembly of equipment (fig. 1) providing facilities for transmission and reception of radioteletype signals on an FS (frequency shift) basis over a frequency range of 2 to 18 mc (megacycles). Maximum power output is approximately 400 watts. Facilities are provided for operation of full-duplex, half-duplex, or one-way reversible circuits (par. 60). C-w (continuous-wave) telegraphy facilities are provided and a-m (amplitude-modulated) voice transmission may be used alone or simultaneously with teletypewriter operation. Shelter S-55/GRC, containing the communications equipment, is normally transported by a 2½-ton, 6 x 6 cargo truck (modified). Power Unit PE-95-(*), installed in a 1-ton trailer, is towed by the cargo truck. The complete radio set is sufficiently compact to be transported in a type C-82 aircraft. Telegraphy and radiotele-

phone facilities can be used in motion or at a halt. For teletypewriter communication it is recommended that the vehicle be brought to a halt. Under favorable conditions, on smooth terrain, teletypewriter operation in motion is feasible. Teletypewriter operation in motion must be on a one-way reversible basis.

b. For mobile, one-way reversible operation, three whip antennas are used—two for receiving and one for transmitting. Mobile-at-halt operation normally utilizes whip antennas. If time permits, however, a doublet transmitting antenna should be erected to improve transmitted signal strength. For semifixed installations, doublet antennas are used for transmitting and receiving, the latter with two antennas for dual space diversity reception, if desired. One-way reversible, half-duplex, or full-duplex service may be used for both mobile-at-halt and semifixed operation. For detailed descriptions of types of operation and

service available, see paragraphs 59 and 60.

c. The equipment consists of Joint Army-Navy receivers, radioteletype components, a transmitter, and teletypewriter equipment. These have been modified for this application. Components of the radioteletype equipment are in special, compact, shock-mounted cabinets, to enable them to be conveniently located in a limited amount of space. All operating components are mounted on tables and shelves in Shelter S-55/GRC. Storage cabinets are also

provided. Figures 2, 3, and 4 show the equipment inside Shelter S-55/GRC, which may be mounted on a 2½-ton, 6 x 6 cargo truck. Power is supplied by Power Unit PE-95-G which is mounted in a 1-ton, two-wheel cargo trailer. Figure 1 shows Radio Set AN/GRC-26 mounted on a truck.

d. Figure 75 is a block diagram of Radio Set AN/GRC-26 which shows the components and their relative functions in the radio set. Figure 5 is a simplified block diagram.

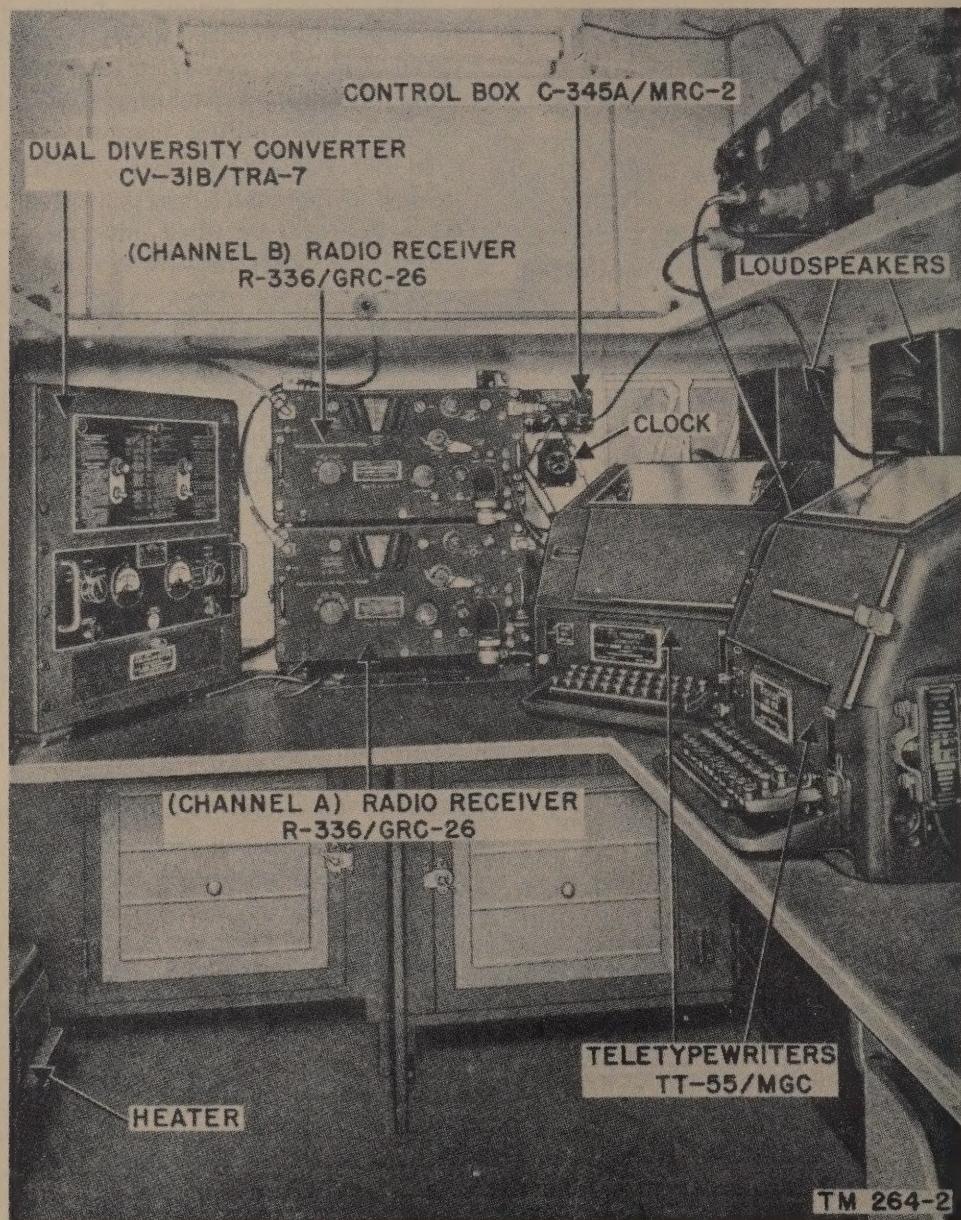


Figure 2. Radio Set AN/GRC-26, receiving components.

4. Application of Equipment

Radio Set AN/GRC-26 is designed for all applications of Radio Set SCR-399-(*), and additional applications where the traffic-handling facilities of radioteletype and the ability to relay to other services are required. Radio Set AN/GRC-26 will probably be used down to division level. Some of the possible applications are—

a. Beachhead landing force signal communications in amphibious operations to higher

headquarters.

b. Signal communications from advanced command posts and other command and administrative headquarters in land operations to higher headquarters.

c. Signal communications with mobile communication centers.

d. Interconvoy and intraconvoy signal communication.

e. Signal communications from ground headquarters to airborne commands.

f. Signal communications from corps com-

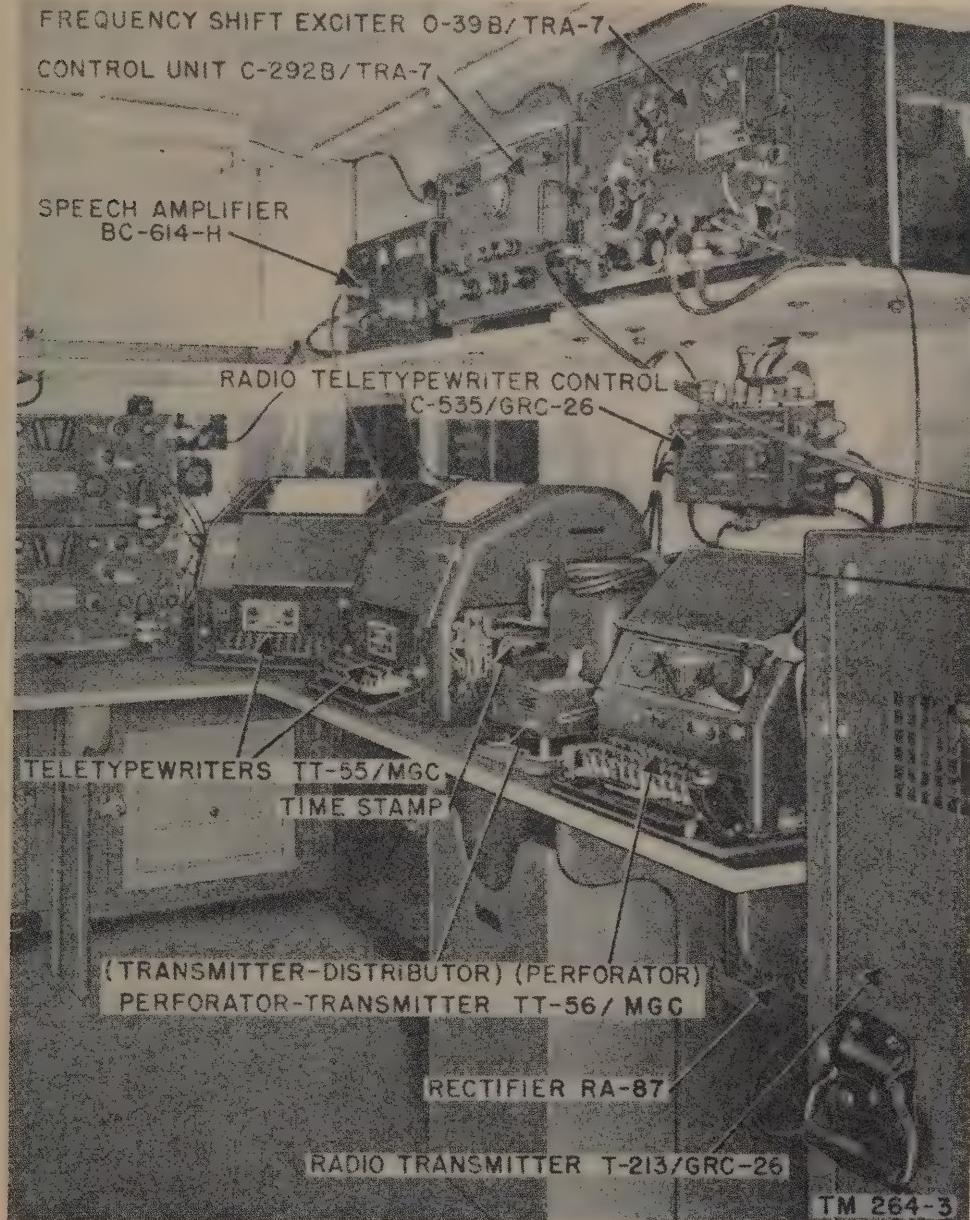


Figure 3. Radio Set AN/GRC-26, teletypewriter operating components.

mand post to rapidly moving subordinate or supporting echelons.

g. Signal communications from division command post to subordinate or supporting elements such as combat commands.

h. Signal communications from fixed bases prior to the establishment of more permanent type facilities.

5. Simplified System Explanation

a. Figure 5 shows a simplified block diagram

of the major components of Radio Set AN/GRC-26. The transmitter may be used for voice and radioteletype transmission simultaneously (A, fig. 5). The teletypewriter equipment, Control Unit C-292(*)/TRA-7, Frequency Shift Exciter O-39(*)/TRA-7, Speech Amplifier BC-614-(*), and Radio Transmitter T-213/GRC-26, are used in this type of operation. The signal is radiated by a single antenna.

b. During reception, two antennas are used. The voice portion of the received signal is



Figure 4. Radio Set AN/GRC-26, transmitting components.

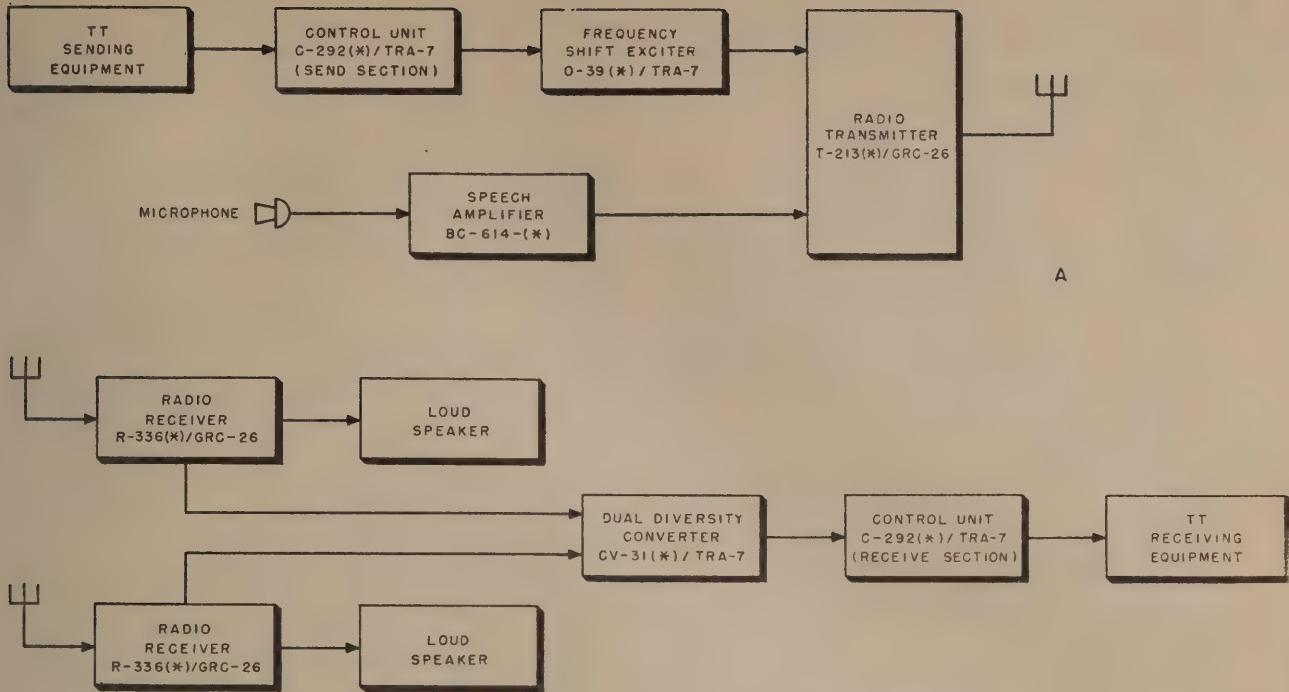


Figure 5. Radio Set AN/GRC-26, simplified block diagram.

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amplified and detected by two Radio Receivers R-336/GRC-26 and fed to the loudspeakers (or headsets). The radioteletype portion of the received signal is removed from the receivers at the i.f. (intermediate frequency) and passed through Dual Diversity Converter CV-31(*)/TRA-7 and Control Unit C-292(*)/TRA-7 to the teletypewriter equipment (B, fig. 5).

c. See figure 75 for a block diagram showing, in greater detail, usage of the major components of Radio Set AN/GRC-26.

6. Technical Characteristics

a. RADIO TRANSMITTER T-213/GRC-26 AND FREQUENCY SHIFT EXCITER O-39B/TRA-7. See TM 11-281 for details on Speech Amplifier BC-614-(*)�.

Frequency range:

Transmitter	2 to 18 mc.
Exciter	2 to 6 mc (multiplied in transmitter).

Transmitter type	Master oscillator, buffer-doubler, and power amplifier (Radio Transmitter BC-610-F or BC-610-G, modified).
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Types of signals transmitted	850-cycle FS radioteletype.
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FS keying.	
C-w.	
Voice (with Speech Amplifier BC-614-(*)�).	
Distance range	1,000 miles, depending on conditions of ionosphere, terrain, and frequency.
Type of modulation	FS and amplitude (voice) simultaneously.
Number of tubes:	
Transmitter	16.
Exciter	10.
Power input:	
Transmitter	2,000 watts at 115 volts, 50 to 60 cps (cycles per second).
Exciter	185 watts at 115 volts, 50 to 60 cps.
Power output:	
Teletypewriter or	
c-w operation	400 watts maximum.
Voice operation	300 watts maximum.
Antennas:	
Whip	15 feet long. Consists of Mast Sections MS-49 through MS-53.
Doublet	Wire W-1 cut to desired length, supported by Masts AB-155/U or lance poles.
Power supply	115-volt, 60-cycle ac (alternating current).
Weight:	
Transmitter	400 pounds.
Exciter	125 pounds.

b. RADIO RECEIVER R-336/GRC-26 AND DUAL DIVERSITY CONVERTER CV-31B/TRA-7.

Receiver frequency range:

Band A	1.5 to 3.0 mc.
Band B	3.0 to 5.0 mc.
Band C	5.0 to 8.0 mc.
Band D	8.0 to 11.0 mc.
Band E	11.0 to 14.0 mc.
Band F	14.0 to 18.0 mc.

Receiver type Single conversion superheterodyne receiver. F-m (frequency-modulated) discriminator circuit in Dual Diversity Converter CV-31B/TRA-7.

Types of signals which can be received:

Receiver alone ... C-w, FS, tone, and voice.

Receiver and converter FS radioteletype signals.

Two receivers and converter .. FS radioteletype signals, dual space diversity reception.

Number of tubes:

Receiver 11 (each receiver).
Converter 18.

Intermediate frequency 470 kc (kilocycles).

Power input:

Receiver 80 watts at 115 volts, 50 to 60 cps.
Converter 175 watts at 115 volts, 50 to 60 cps.

Power supply 115-volt, 60-cycle ac.

Antennas:

Whip 12 feet long. Consists of 2 Mast Sections MS-116-A, 1 each Mast Sections MS-117-A and MS-118-A.

Doublet Wire W-1 cut to desired length supported by Masts AB-155/U or lance poles.

Weight:

Receiver 65 pounds.
Converter 220 pounds.

c. CONTROL UNIT C-292B/TRA-7.

Types of signals Polar and neutral teletypewriter signals.

Polar input	0.025 ampere.
Neutral input	0.060 ampere.
Polar output	0.020 and 0.025 ampere.
Neutral output	0.060 ampere.
Number of tubes	16.
Power input	170 watts.
Power source	115-volt, 60-cycle ac.
Weight	100 pounds.

d. POWER UNIT PE-95-(*)

Number of cylinders .. 4.

Bore 3 $\frac{1}{4}$ inches (3.1875 inches in A, B, and C models).

Stroke 4 $\frac{1}{4}$ inches (3.75 inches in A,

B, and C models).
Piston displacement 134.2 cubic inches (119.7 cubic inches in A, B, and C models).

Compression ratio 6.5 to 1 (6.1 to 1 in A, B, and C models).

Engine speed 1,200 rpm (revolutions per minute) (1,800 in G and H models).

Type of cooling Water.

Cooling system capacity 15.5 quarts (17 quarts in A, B, and C models).

Spark plugs:

Size 14 mm (millimeter).

Gap 0.030 inch (0.025 inch in F, G, and H models).

Fuel tank capacity ... 10 $\frac{1}{2}$ gallons.

Crankcase oil capacity 5 quarts (4 quarts in A, B, and C models).

Battery voltage 12 volts, c/o two 6-volt batteries in series (one 6-volt battery in F model).

Generator:

Power output 5 kw (kilowatts) (10 in G and H models).

Voltage 120 volts and 240 volts (115 volts only in A, B, and C models).

Power factor 80 percent.

Fuel consumption 1.1 gallons per hour (1.2 gallons in A, B, and C models).

Weight:

A, B, and C models 1,360 pounds.

F model 1,545 pounds.

G and H models .. 1,556 pounds.

7. Packaging Data

a. When packaged for export shipment, Radio Set AN/GRC-26 is packed in two wooden export crates. Items may be packaged in a manner different from that shown, depending on supply channel. The size, weight, and volume of each crate are as follows:

Number of crates	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)
1...	93 $\frac{7}{8}$	155	91 $\frac{1}{4}$	768	10,000
1...	75 $\frac{3}{4}$	108	80 $\frac{3}{4}$	382	5,400
Total weight (lb).....					15,400

b. When packaged for domestic shipment, Radio Set AN/GRC-26 is packed in two crates. Shelter S-55/GRC is not crated. Power Unit PE-95-G is mounted on a 1-ton cargo trailer

which is in a protective wooden crate. The size, weight, and volume of each crate are as follows:

Number of crates	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)
1	79½	145	81½	544	6,590
1	75¾	108	80¾	382	5,360
Total weight (lb).					11,950

c. The following list indicates the contents of each case. See the packing list attached to each case for exact contents.

Case dimensions (in.)	Contents	Notes
93⅞ x 155 x 91¼ ..	Shelter S-55/GRC in external crate.	Contains operating components, antenna equipment, Reel Unit RL-31, power cables, shoring, and desiccant.
79½ x 145 x 91¼ ..	Shelter S-55/GRC less external crate.	Same components as with external crate.
75¾ x 108 x 80¾ ..	Power Unit PE-95 -G mounted on 1-ton cargo trailer.	Contains gasoline cans, racks, desiccant, and moisture-vapor-proof barrier.

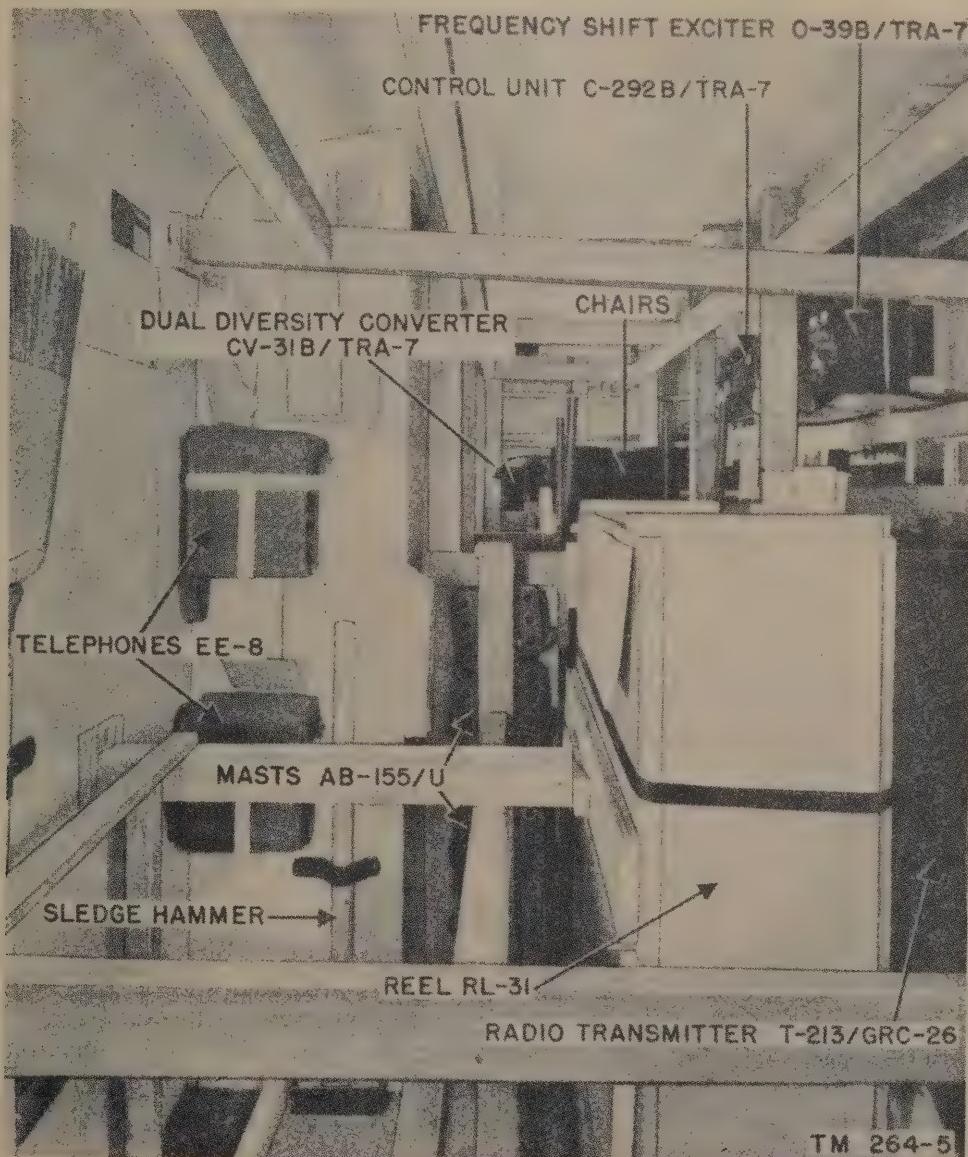
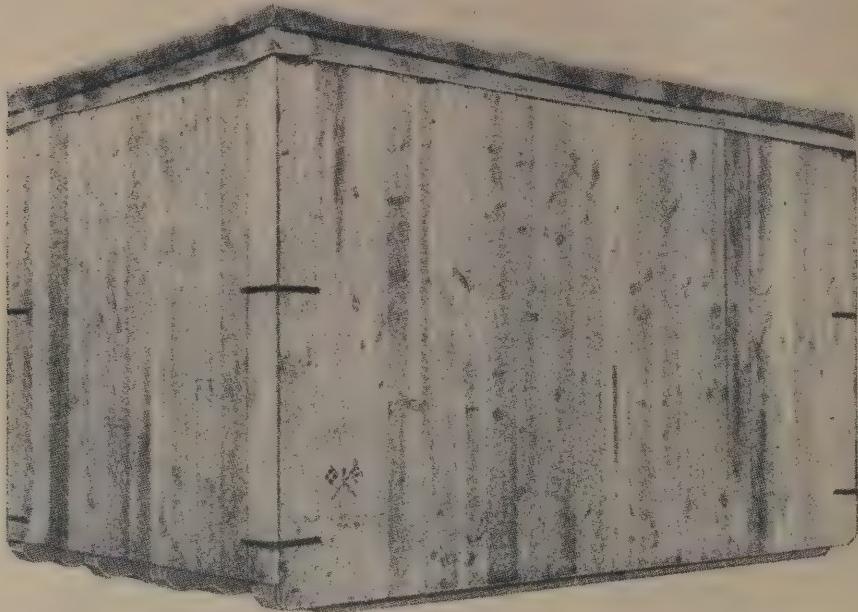


Figure 6. Radio Set AN/GRC-26, interior of shelter packed for shipment.

d. Figure 6 shows the interior of Shelter S-55/GRC packed for export shipment. Figure 7 shows the packing case for Shelter S-55/GRC.

e. An aircraft loading data plate, mounted on the outside of Shelter S-55/GRC, gives the weight, dimensions, and centers of gravity of the radio set, less external crate. Note that

is a steel and plywood structure designed to house operating components of Radio Set AN/GRC-26. The shelter mounts on a standard ordnance 80- by 144-inch cargo truck body for the purpose of transportation or mobile operation. Wall cabinets, operating tables, shelves, wiring, electrical outlets, fire extinguisher, and ventilating blower are part of the shelter. A



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Figure 7. Shelter S-55/GRC, ready for shipment.

the weight includes shelter shoring, desiccant, and other packing materials which are inside the shelter when it is initially shipped from the manufacturer's plant (fig. 6). *The weight shown on the plate is reduced by 1,020 pounds when the shoring, desiccant, and packing materials are removed.* Centers of gravity remain substantially unchanged.

8. Table of Components

See appendix III for complete table of components. All components of Radio Set AN/GRC-26 are inside the two packing cases listed in paragraph 7.

9. Description of Shelter

a. Shelter S-55/GRC (figs. 28, 29, and 31)

roof hatch, six wall windows, and a rear door window are provided with screening and black-out blinds and may be opened for adequate ventilation. Outside dimensions of shelter are 12 feet 1 inch long by 81½ inches wide by 79½ inches high; weight is 3,100 pounds. R-f (radio-frequency) bypass capacitors have been installed in the fluorescent lights; all fluorescent lights used in the immediate area of the receivers should be bypassed.

b. Shelter S-56/G is similar to the shelter described above, but it does not contain wall cabinets, operating tables, shelves, wiring, or electrical outlets. Shelter S-56/G includes a fire extinguisher and ventilating blower. Dimensions are the same as for Shelter S-55/GRC; weight is 2,300 pounds.

10. Radio Transmitter T-213/GRC-26 (fig. 8)

a. Radio Transmitter T-213/GRC-26 is a medium-power transmitter of voice or c-w signals over a frequency range of 2 to 18 mc. Frequency coverage is accomplished by the use of plug-in tuning units, coils, and plug-in type Capacitor CA-423. Frequency is normally controlled by Frequency Shift Exciter O-39(*)/TRA-7 for all types of operation. The master oscillator in the radio transmitter is available in an emergency for c-w and voice operation. Power output is approximately 400 watts on c-w operation and 300 watts on voice operation. The transmitter weighs approximately 400 pounds.

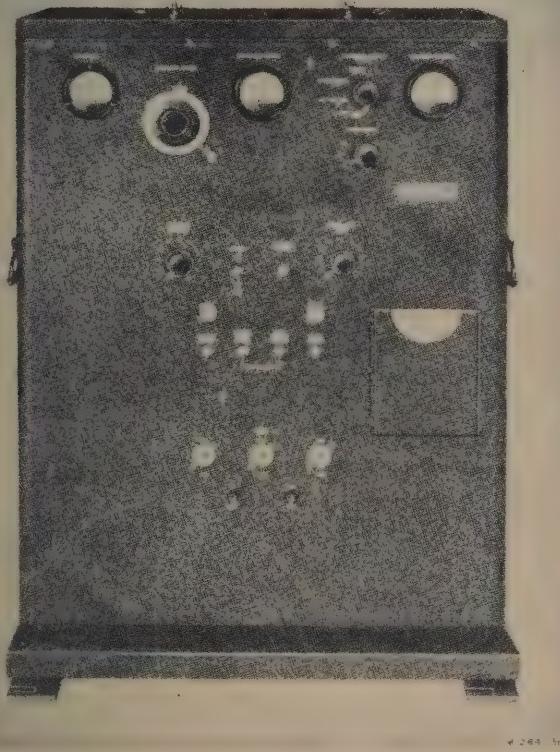


Figure 8. Radio Transmitter T-213/GRC-26,
front view.

b. Radio Transmitter T-213/GRC-26 is a modified version of Radio Transmitter BC-610-F or BC-610-G (see TM 11-4057 and TB SIG 220 with supplement on Order No. 24627-Phila-49) with the following changes:

- (1) A hole with rubber grommet is provided in the top cover to allow feedthrough of coaxial input Cord CG-

389/U. The shielding of the cord is effectively grounded to the transmitter frame.

- (2) Socket SO-239 is installed on the left side panel to accommodate RF Cable Assembly CG-557/U, a transmission line, and RF Cable Assembly CG-558/U, which connects to Antenna Tuning Unit BC-939-A. This socket replaces two feedthrough insulators which are part of Radio Transmitter BC-610-(*)�.

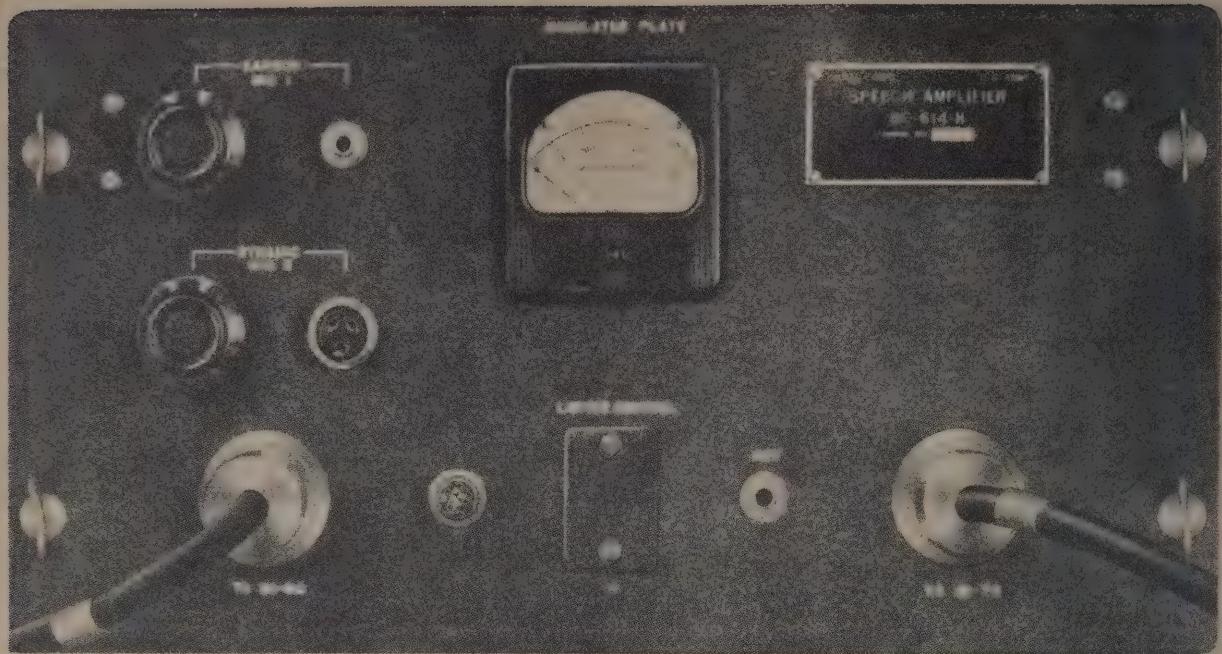
c. The transmitter is made up of three chassis. The top chassis is referred to as the r-f section and includes all of the r-f components. The center chassis is called the modulator section, since it contains most of the audio and modulator equipment. The bottom chassis includes the h-v (high-voltage) power supply and overload relay. It is called the power supply section. The three chassis are assembled into a sheet steel cabinet with a front panel upon which the external controls and metering instruments are mounted. Refer to TB SIG 220 and TM 11-4057 for more complete information on Radio Transmitter BC-610-E or BC-610-G.

d. In Radio Set AN/GRC-26, the transmitter is mounted near the entrance door of the shelter. The transmitter may be swung away from the shelter wall, to permit access to the rear, by loosening the left front and left rear bolts and removing the right front and right rear bolts with the special wrench provided for this purpose. Use the left front bolt as a pivot.

11. Speech Amplifier BC-614-H (fig. 9)

a. Speech Amplifier BC-614-H is shock-mounted to the upper shelf at the left of Control Unit C-292B/TRA-7 (fig. 3). For convenience of removal, four snap fasteners are used to anchor the speech amplifier to its shock mounting. The weight of the speech amplifier, less the shock mount, is approximately 31 pounds.

b. The speech amplifier raises the microphone output to a level suitable for voice modulation of the transmitter. Speech Amplifier BC-614-H contains its own plate and filament supply unit which draws approximately 40 watts from the 115-volt, 50/60-cycle a-c source. Refer to TM 11-281 for additional information on this unit.



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Figure 9. Speech Amplifier BC-614-H.

12. Radio Teletypewriter Control C-535/GRC-26 (fig. 10)

a. Radioteletypewriter Control C-535/GRC-26 is mounted on the shelter wall, below Control Unit C-292B/TRA-7 (fig. 3). It is used as a connection and switching box and performs the following functions:

- (1) Provides means for connecting Teletypewriters TT-55/MGC to the receiving and transmitting circuits in Control Unit C-292B/TRA-7.
- (2) Provides switching of the various functions of Perforator-Transmitter TT-56/MGC.
- (3) Provides extension circuits for remote operation.
- (4) Provides jack for c-w transmission.
- (5) Provides jack for frequency-shift keying.
- (6) Provides neutral circuit jack for emergency radioteletype reception.

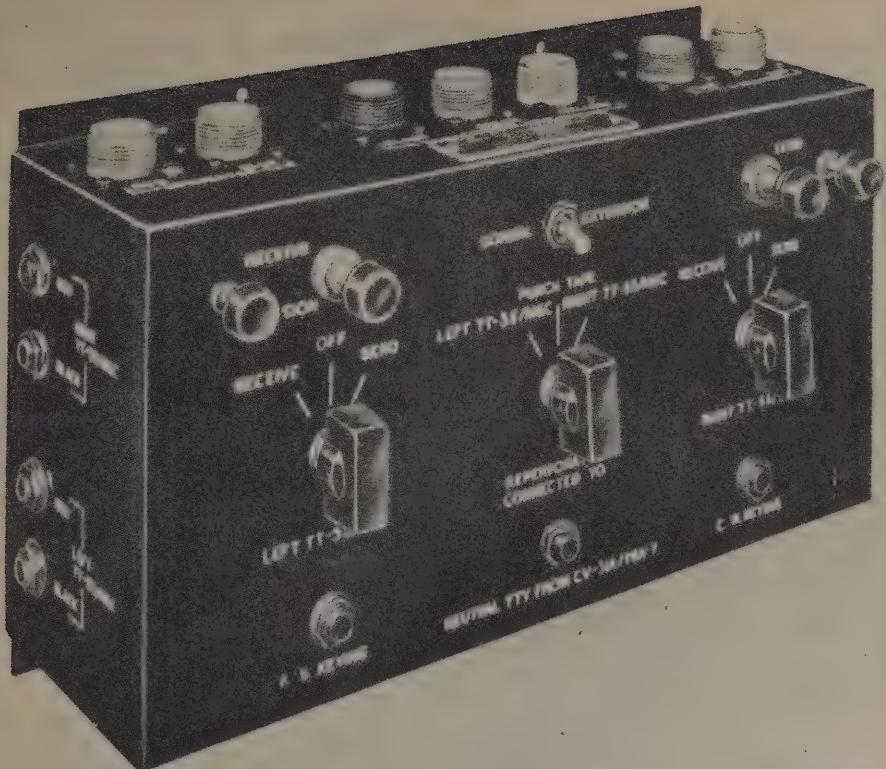
b. The weight of Radioteletypewriter Control C-535/GRC-26 is approximately 5 pounds.

13. Radio Receiver R-336/GRC-26

a. Radio Receivers R-336/GRC-26 are mounted on the operating table adjacent to the converter. Two identical receivers are mounted one above the other on a shock-mounted base (fig. 2). The bottom receiver is referred to as the channel A receiver; the top receiver is for channel B.

b. Radio Receiver R-336/GRC-26 consists of Radio Receiver BC-342-N, which has been modified as follows:

- (1) Rebuilding and compensation of the h-f (high-frequency) oscillator to reduce drift under varying climatic conditions.
- (2) Stabilization of the h-f oscillator plate voltage supply to reduce drift under conditions of varying line voltages. Improved stability is achieved by the use of voltage regulated supply on the plate of the h-f oscillator and the screen of the first detector. Rectifier RA-20-B furnishes the regulated plate supply.
- (3) Addition of a coaxial connector on the front panel to make available an



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Figure 10. Radioteletypewriter Control C-535/GRC-26.

i-f voltage output for connection to the dual diversity converter.

- (4) Addition of a coaxial connector on the front panel for antenna connection.
- (5) Replacement of the LAMPS fuse mounted on the front panel by a B PLUS $\frac{1}{8}$ AMP fuse to protect the h-v supply.

c. Refer to TM11-850 for additional information on Radio Receiver BC-342-N.

14. Antenna Tuning Unit BC-939-A

(fig. 4)

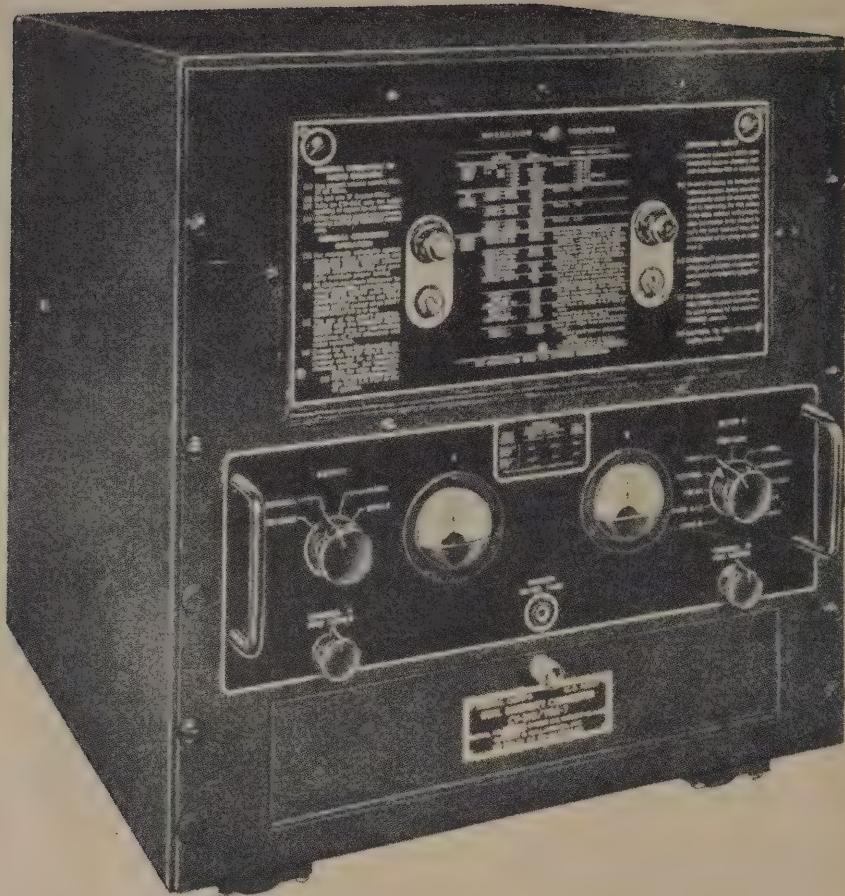
Antenna Tuning Unit BC-939-A is mounted on the top of Radio Transmitter T-213/GRC-26 by means of four wingnuts. It couples the output of the transmitter to the transmitting whip or long-wire antenna. Refer to TM 11-281 for additional information.

15. Radioteletype Equipment

a. Dual Diversity Converter CV-31B/TRA-7

(figs. 2 and 11) is shock-mounted to the operating table to the left of the receivers. It receives the i-f output of one or two receivers and converts frequency-shift signals to neutral d-c (direct-current) and polar signals. The polar signals are converted to neutral d-c signals by Control Unit C-292B/TRA-7 for the operation of the teletypewriter equipment. The neutral d-c line from the converter is terminated in a jack on Radioteletypewriter Control C-535/GRC-26, for emergency reception of teletypewriter signals. The discriminator circuit permits operation with frequency shifts of 200 to 1,000 cycles.

b. Control Unit C-292B/TRA-7 (figs. 3 and 12) is shock-mounted to the upper shelf. It consists of an electronic repeater and a built-in power supply. The control unit converts neutral signals from a sending teletypewriter to polar signals for operation of Frequency Shift Exciter O-39(*)/TRA-7. It also receives polar signals from Dual Diversity Converter CV-31(*)/TRA-7 and converts them to neu-



TM 264-8

Figure 11. Dual Diversity Converter CV-31B/TRA-7.

tral signals for operation of a receiving teletypewriter. The control unit provides facilities for establishing full-duplex, half-duplex, one-way reversible or emergency services (par. 60).

c. Frequency Shift Exciter O-39B/TRA-7 (figs. 3 and 13) is shock-mounted to the upper shelf to the right of Control Unit C-292B/TRA-7. It is connected to the transmitter by means of Cord CG-389/U, which plugs into the crystal socket of the transmitter. The exciter functions as a master oscillator tunable from 2 to 6 mc, and provides sufficient r-f driving power to permit multiplying in the low-power stages of the transmitter, resulting in a transmitter output frequency range of 2 to 18 mc. Polar signals from the control unit, originating from the mark (d-c output) and

space (no d-c output) impulses of the sending teletypewriter, shift the oscillator frequency of the frequency shift exciter. An audio monitoring circuit is built into the exciter unit, which, when used in conjunction with Frequency Meter BC-221-(*), allows the operator to make a continuous check on the amount of frequency shift of the transmitter output.

d. For further information on the radioteletype equipment, refer to TM 11-278.

16. Teletypewriter TT-55/MGC (fig. 3)

Teletypewriters TT-55/MGC consist of Teletypewriters TG-7-B which have been modified by the following additions:

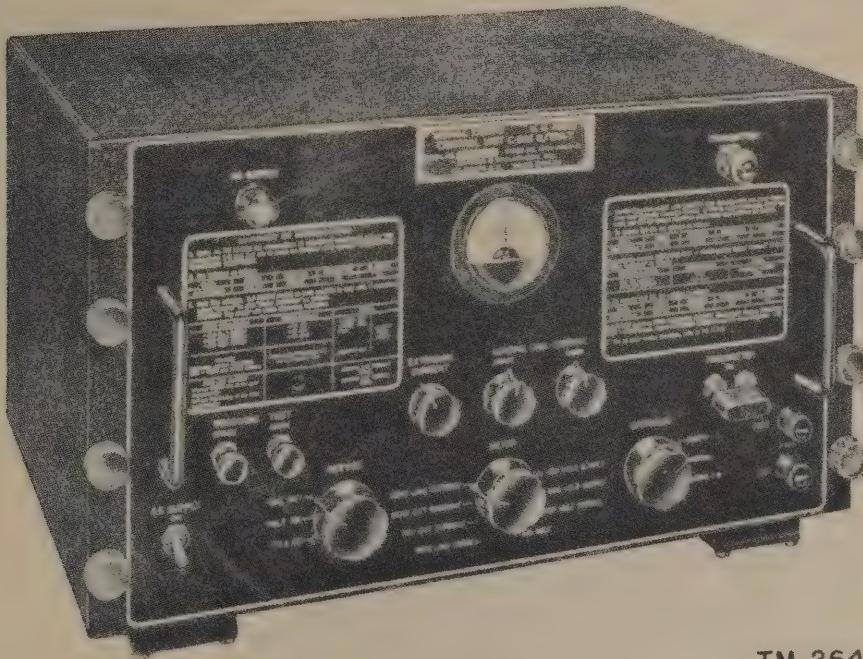
a. An addition of a power lead filter.

b. A 0.01-uf (microfarad) capacitor to ground from one side of the a-c line.

c. A 0.1-uf capacitor to ground from one side of the selector magnet lead.

d. The case is grounded to the keyboard. Refer to TM 11-352 (and supplement of Order No. 18723-Phila-49) for a complete description of the modification and the theory of operation of Teletypewriter TG-7-B.

is mounted on the shelter wall to the right of Radio Receivers R-336/GRC-26. The control box provides two volume controls to permit reduction of the operating level of two Loudspeakers LS-3 (or two headsets). This is necessary because the receiver volume controls are normally fully advanced during reception of teletypewriter signals. Cords which are part



TM 264-9

Figure 12. Control Unit C-292B/TRA-7.

17. Perforator-Transmitter TT-56/MGC (fig. 3)

Perforator-Transmitter TT-56/MGC consists of Reperforator-Transmitter TG-26-A, modified by the addition of a 0.1-uf capacitor for the purpose of r-f noise suppression. The capacitor is connected from the common junction of two 500-ohm resistors and the motor field winding to ground. Refer to TM 11-2201 (and supplement of Order No. 18723-Phila-49) for a complete description of the modification, theory, and operation of Reperforator-Transmitter TG-26-A.

18. Control Box C-345A/MRC-2

Control Box C-345A/MRC-2 (figs. 2 and 37)

of the control box connect this control box to the receivers. Jacks are provided for connection to loudspeakers and headsets.

19. Frequency Meter BC-221-(*) (fig. 14)

Frequency Meter BC-221-(*) is located on a special shelf adjacent to the transmitter (fig. 4). It serves as a frequency standard for the radio set. When used in conjunction with the 850-cycle oscillator of Frequency Shift Exciter O-39(*)/TRA-7, the frequency meter permits a constant check on the amount of frequency shift of the transmitter output. Refer to TM 11-300 for more detailed information on the frequency meter.

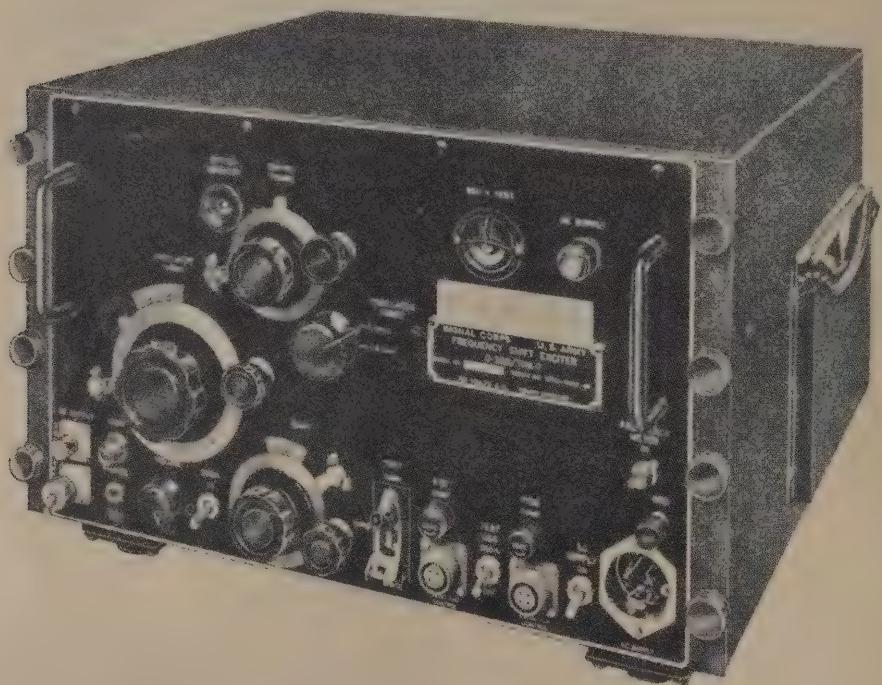
20. Antenna Equipment

a. WHIP ANTENNAS.

(1) *Receiving.* Two receiving whip antennas are furnished, each consisting of two Mast Sections MS-116-A, one Mast Section MS-117-A, and one Mast Section MS-118-A in Mast Base MP-65-C with Adapter Kit M-459. Mast Base MP-65-C is mounted on Mast Bracket MP-50, which is secured to the front exterior wall of the shelter. Components are furnished for one additional antenna which may be used with auxiliary equipment. Spare

and secured to the rear exterior wall of the shelter. An insulated guy assembly is provided to tie the whip in a horizontal position when the set is in motion.

b. DOUBLET ANTENNAS. Six Masts AB-155/U (fig. 15) and 1,000 feet of Wire W-1 are furnished for the construction of half-wave doublet antennas. At the higher frequencies (4 to 18 mc), where shorter wire lengths are required, two masts are used to support each doublet. Therefore, three antennas may be erected, two are used for receiving on a space diversity basis and one is used for transmitting. Four wooden lance poles are available for use



TM 264-10

Figure 13. Frequency Shift Exciter O-39B/TRA-7.

mast sections are also furnished. The whips are tied down with insulated guy assemblies when the set is in motion.

(2) *Transmitting.* One transmitting whip antenna is furnished, consisting of one each of Mast Sections MS-49, MS-50, MS-51, MS-52, and MS-53 in Mast Base MP-47-A, which is mounted on Bracket MT-657/GRC

as antenna masts in temporary installations. Two RF Cable Assemblies CG-557/U (500-ft) on Reels DR-4 are used for receiving antenna lead-ins. One RF Cable Assembly CG-557/U (75-ft) is used as a transmission line for the transmitting doublet.

21. Power Unit PE-95-G

a. Power Unit PE-95-G is a complete electric generating plant. It consists of an engine

and a generator with the necessary accessories and controls, all mounted in a metal housing with a skid base. The complete unit is mounted in a 1-ton, two-wheel, cargo trailer.

b. The power unit supplies single-phase 60-cycle ac at 120 volts. The rated capacity is 10 kw or 12.5 kva (kilovolt-amperes) at 80 percent power factor. For a complete description of this unit, see TM 11-904.

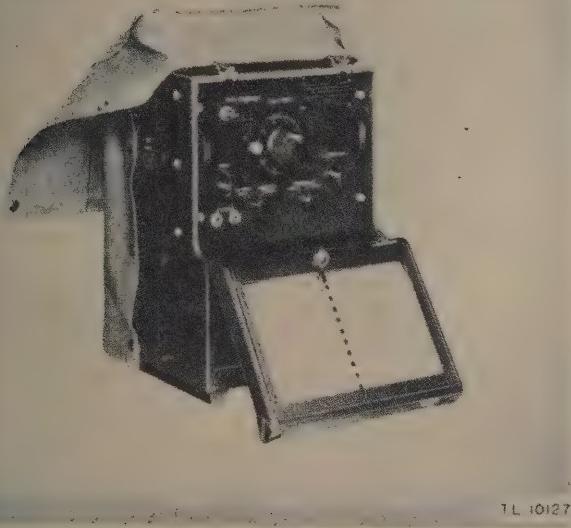


Figure 14. Frequency Meter BC-221-AA,
in metal cabinet.

22. Rectifier RA-87 (figs. 16 and 70)

a. Rectifier RA-87 converts 95- to 125-volt or 190- to 250-volt, 50- to 60-cycle, a-c power to 115-volt d-c power for the operation of teletypewriter line circuits.

b. The rectifier chassis base, which mounts all parts and connections, is inclosed at the top and bottom with sheet steel covers. The top cover has a small door in the front which is used to give access to the voltage tap-changing panel. Two twist-type receptacles for d-c loads, three receptacles for a-c loads, an ON-OFF switch, and the input power cord are located on the front panel of the chassis. For a complete description of the operation and function of this unit, see TM 11-957.

23. Line Unit BE-77-A (fig. 17)

Line Unit BE-77-A is an electrical device

designed for use as part of Army tactical (field) teletypewriter sets which transmit and receive d-c neutral type signals. For further information on this unit, see the diagram in figure 71 and TM 11-359. The functions of the line unit are to—

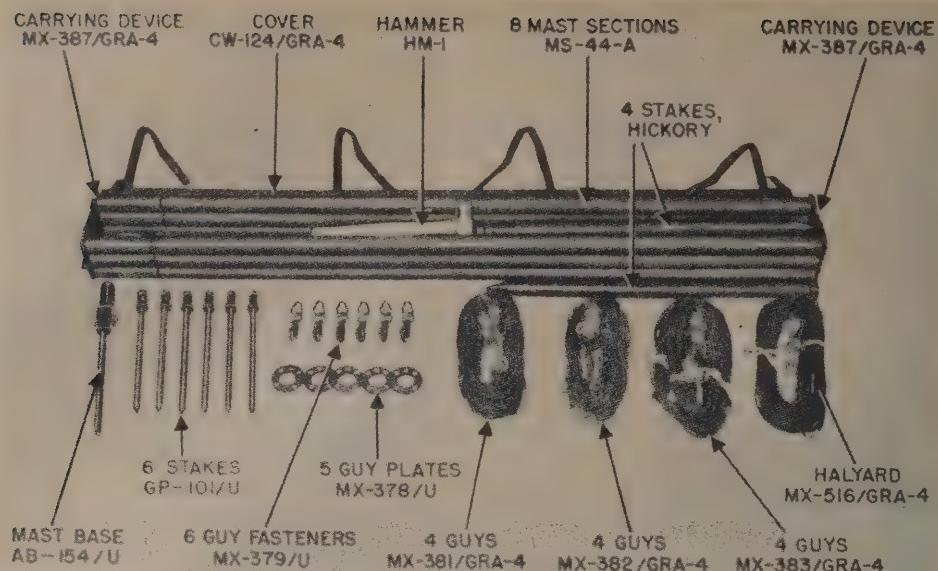
- a. Connect the teletypewriter signal circuits to neutral type telegraph lines.
- b. Provide an adjustment to improve the quality of signals applied to the teletypewriter typing unit. Most of the distortion which the telegraph line introduces into teletypewriter signals may be removed by proper adjustment of the line unit relay.
- c. Measure and adjust line current.
- d. Provide connection to a source of line and local current supply.
- e. Measure the voltage of the d-c power source.
- f. Measure the quality of the received signals.

24. Rectifier RA-20-B (fig. 18)

Rectifier RA-20-B is a regulated power supply which operates on an a-c input of 110 to 120 volts to 50 to 60 cycles. The rectifier incorporates a hermetically sealed transformer and choke in a single case designed to protect this component when operating in extremely humid climates. Rectifier RA-20-B is installed in Radio Receiver R-336/GRC-26 and furnishes power for the receiver.

25. Rectifier Power Unit RA-133-A (fig. 19)

Rectifier Power Unit RA-133-A is a regulated power supply which operates on an a-c input of 115 volts or 230 volts at 50 to 60 cps. The power unit incorporates a small line control box which contains an ON-OFF switch and a neon glow lamp to indicate when the set is turned on. This power unit (containing two tubes and a filter circuit), is installed in Frequency Meter BC-221-(*). It replaces the four Batteries BA-23 and six Batteries BA-2 ordinarily used as a portable power supply for the frequency meter. For further information on this unit, see the schematic diagram (fig. 72) and TB 11-300-3.



TM 264-40

Figure 15. Components of Mast AB-155/U.

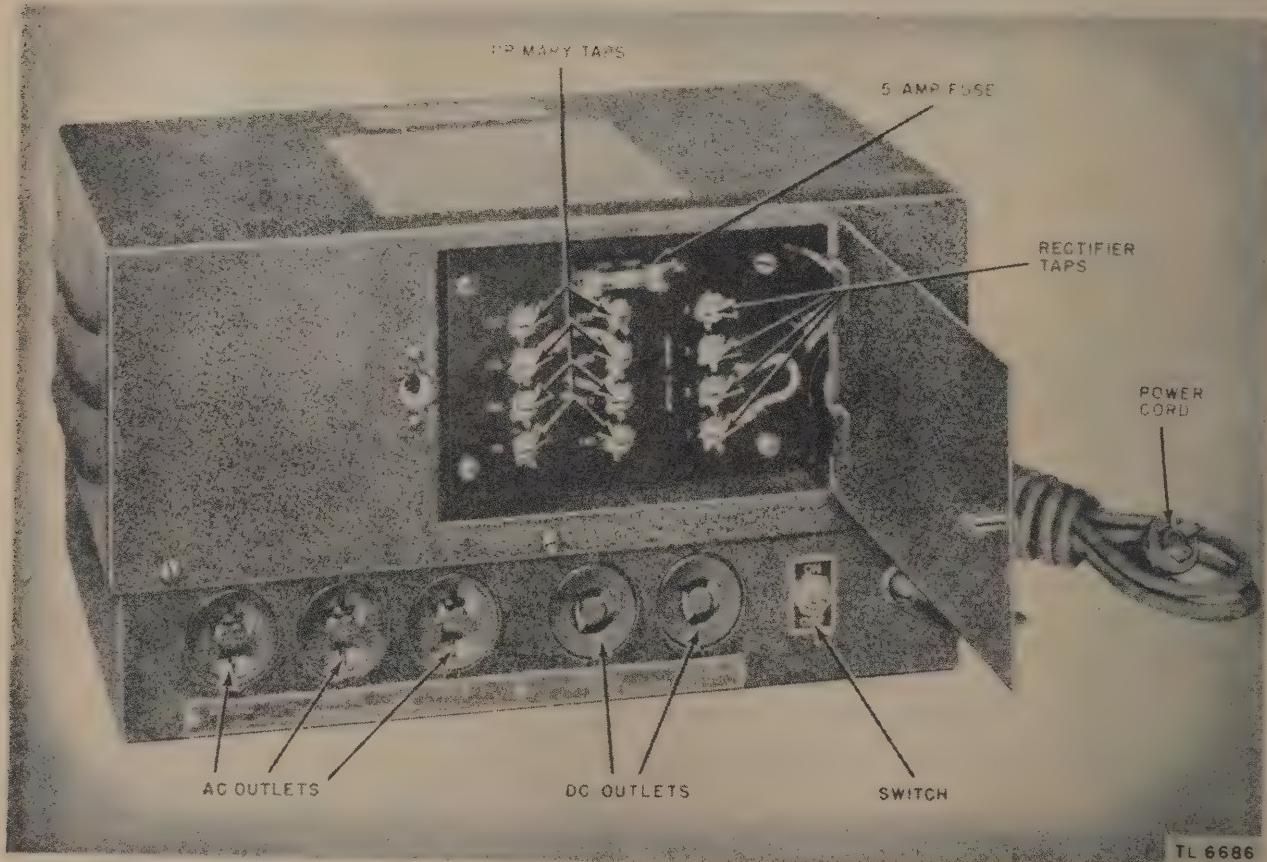


Figure 16. Rectifier RA-87, front view with door open, showing tap-changing panel.

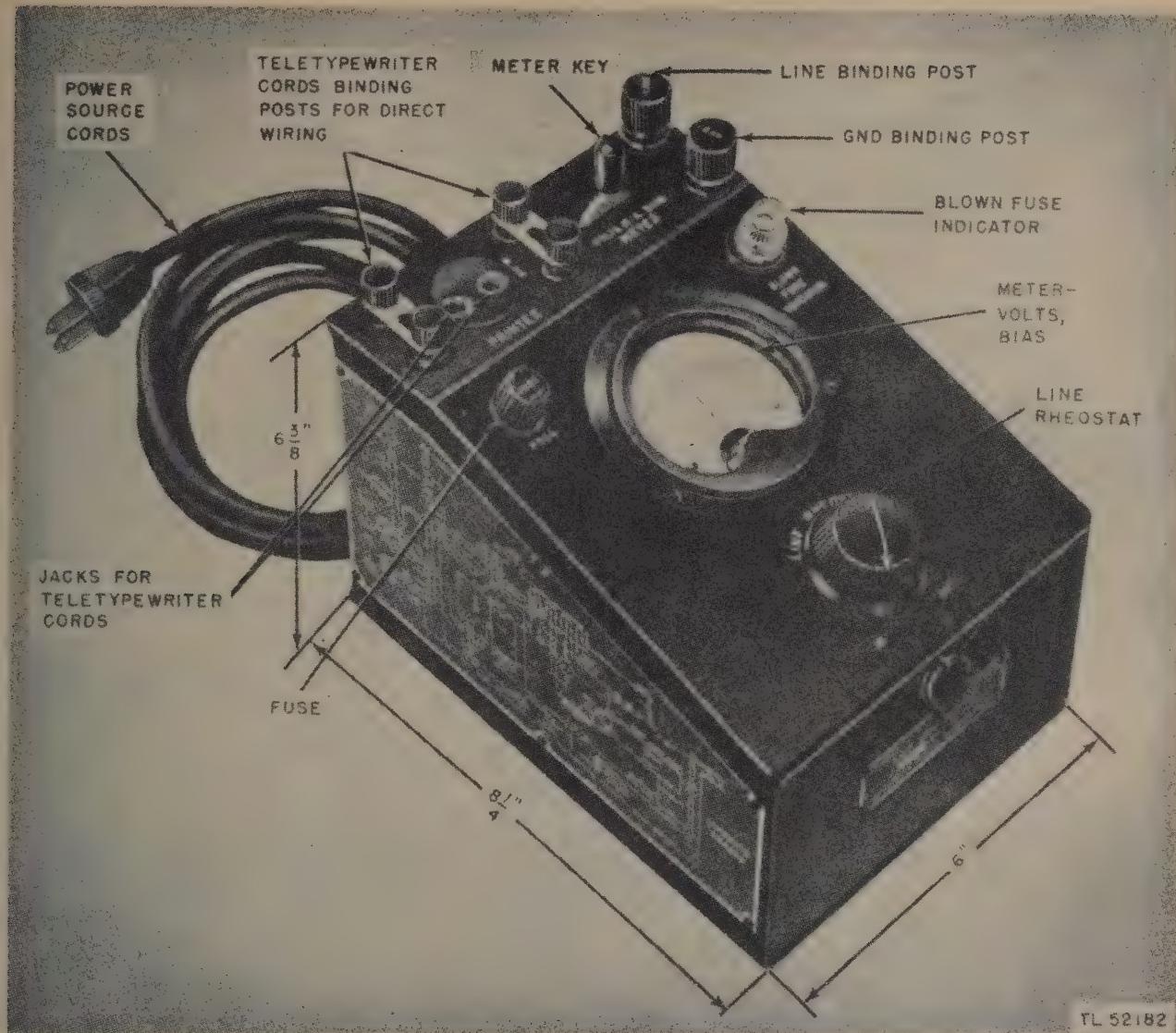


Figure 17. Line Unit BE-77-A.

26. Test Unit I-176 (fig. 20)

Test Unit I-176 is an instrument designed to measure resistance, voltage, and a-c and d-c current. It has five a-c voltage ranges covering 0 to 1,000 volts at a sensitivity of 1,000 ohms per volt, five d-c voltage ranges covering 0 to 1,000 volts at sensitivities of either 1,000 or 20,000 ohms per volt, four a-c current ranges covering 0 to 10 amperes, seven d-c current ranges covering 0 to 5 amperes, and three resistance ranges measuring up to 10 megohms. An additional high-voltage range of 0 to 5,000 volts at a sensitivity of 20,000 ohms per volt has its own special leads and jacks. For further information on this unit, see the schematic diagram in figure 73 and TM 11-2626.

27. Miscellaneous Components

a. TELEPHONE EE-8-(*) (figs. 21 and 74). Telephone EE-8-(*) is a portable field telephone designed for use on either local or common battery telephone systems. It is rugged and compact, and its performance equals that of modern commercial telephones. A talking range of 11 to 17 miles may be expected on Wire W-110-B, depending on weather conditions and the type of construction of the wire line. Two Batteries BA-30 are required to operate it. Telephone EE-8-B may have either

a leather or canvas case. See TM 11-333 for complete information on this unit.

b. KEY J-45 (fig. 22). Key J-45 is a leg-type key which is connected to Radioteletype-writer Control C-535/GRC-26 by Cord CD-201-A. It is plugged into the C. W. KEYING jack. The spring metal snap on which the key is mounted is placed on the leg at a position

above the knee which allows easy hand keying. The keying contacts should be adjusted to a wider gap than is used with a table-type key.

c. MICROPHONE T-17 (fig. 23). Microphone T-17 is an antinoise, carbon-button, type of hand microphone. The plug on the microphone cord plugs into the CARBON MIC. 1 jack on the front panel of Speech Amplifier BC-614-H. The press-to-talk button on the microphone handle controls the operation of the transmitter, turning it on for speech operation when the microphone press-to-talk button is pressed.

d. MICROPHONE T-50 (fig. 24). Microphone T-50 is a small, hand-held, dynamic type microphone. The three-contact plug on the end of the microphone cord plugs into the DYNAMIC MIC. 2 jack on the front panel of Speech Amplifier BC-614-H. The small button on the side of the microphone controls the operation of the transmitter.

e. LOUDSPEAKER LS-3 (fig. 25). This is a permanent-magnet type loudspeaker, housed in a steel case. Included as part of this loudspeaker is a transformer, mounted inside of

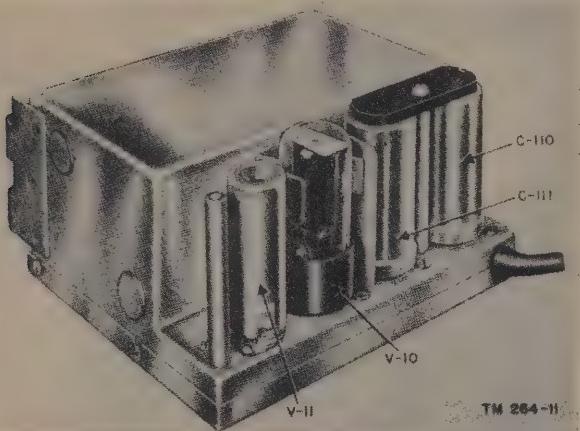


Figure 18. Rectifier RA-20-B.

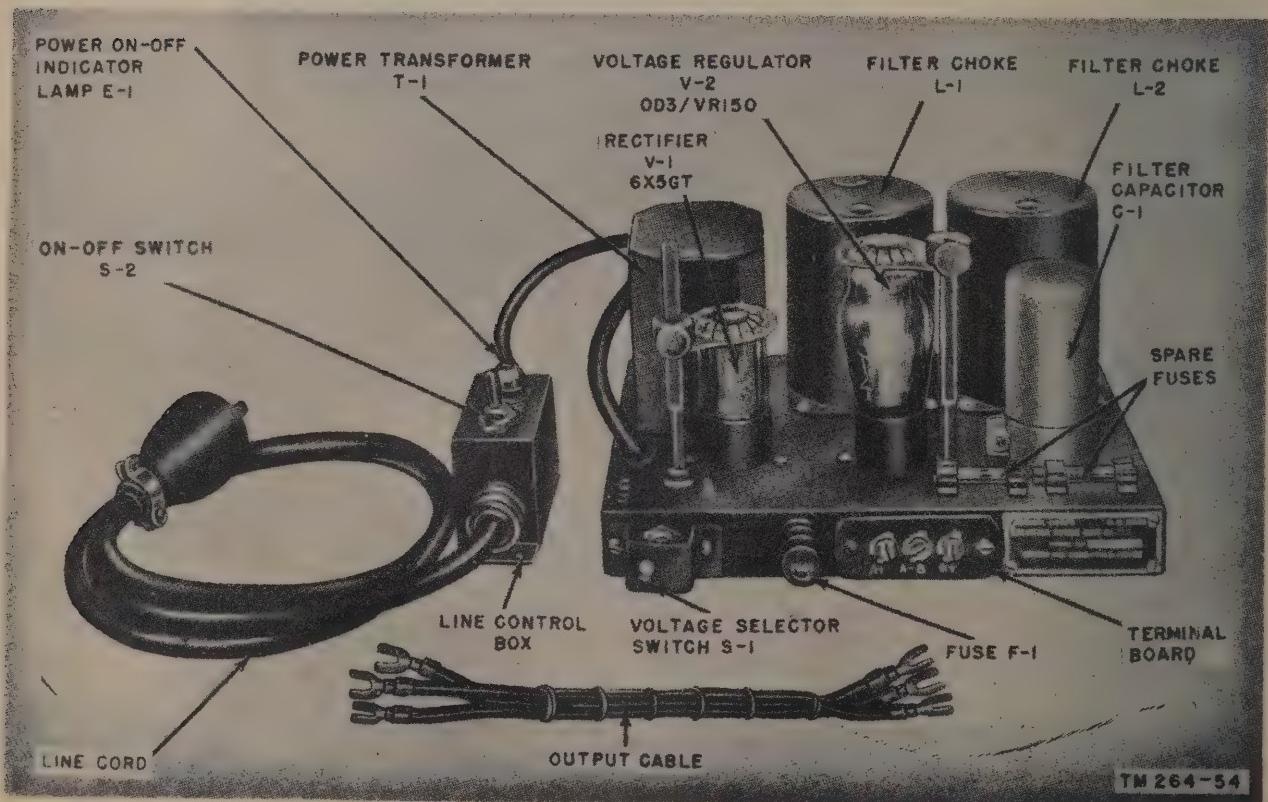


Figure 19. Rectifier Power Unit RA-133-A.

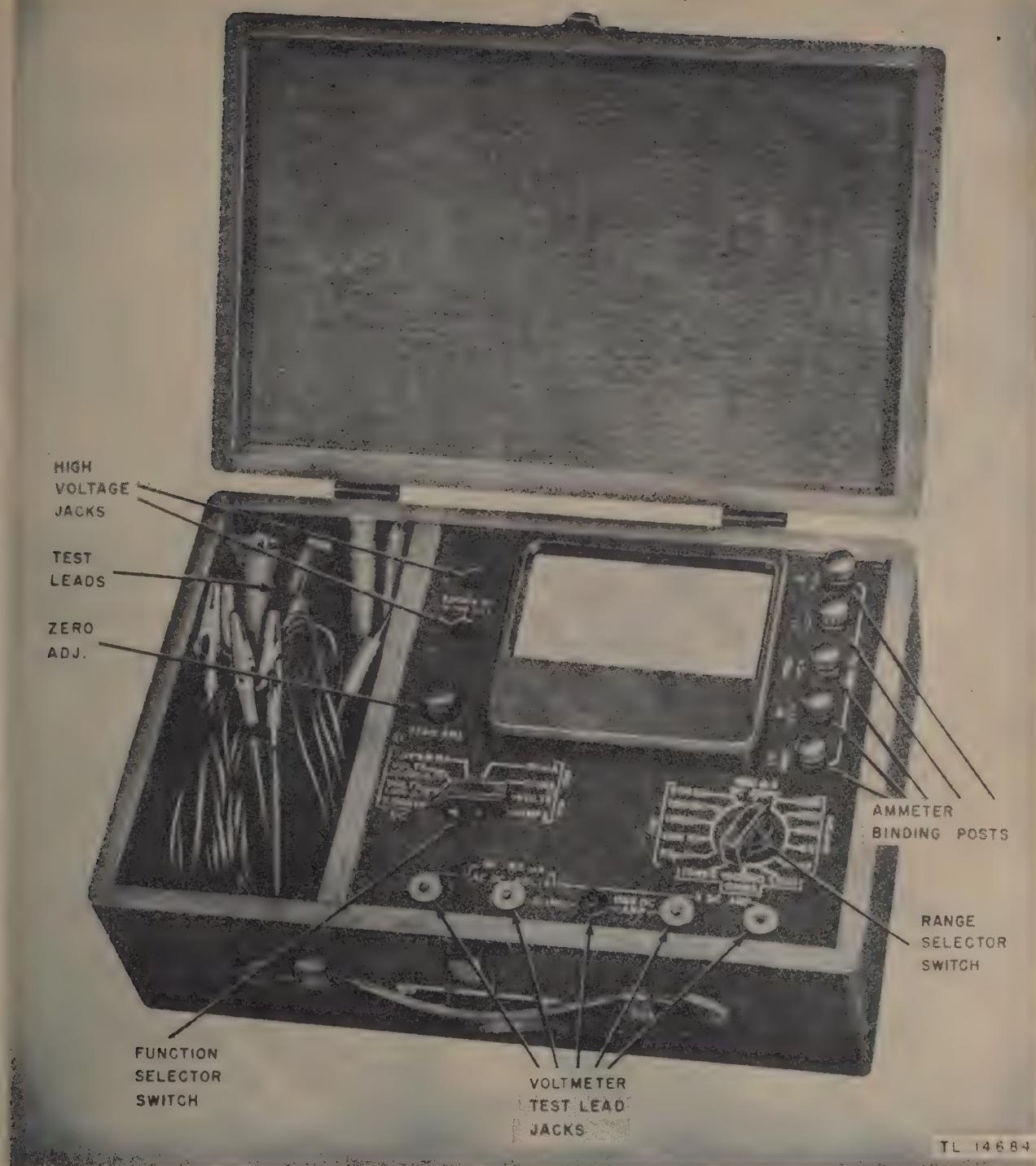


Figure 20. Test Unit I-176, with cover raised.

the steel case, designed to match the impedance of the loudspeaker voice coil to that of the radio receiver output. Cord CD-267 is used to connect the loudspeaker to the receiver.

28. Running Spares

Running spares provided for Radio Set AN/GRC-26 include spare operating components



Figure 21. Telephone EE-8-B.

and spare pluck-out parts. The following items are furnished:

a. GENERAL RUNNING SPARES:

- 24 connectors, solderless.
- 1 Cord CD-267.
- 1 Cord CD-605.
- 1 Cord CD-763.

- 1 Cord CD-764.
- 1 Cord CG-67/MRQ-2.
- 1 RF Cable Assembly CG-557/U (75 ft., 0 in.).
- 1 RF Cable Assembly CG-558/U.
- 1 Special Purpose Cable Assembly CX-1120/U.
- 1 Special Purpose Cable Assembly CX-1150/U.
- 1 Special Purpose Cable Assembly CX-1151/U.
- 1 Special Purpose Cable Assembly CX-1152/U.
- 1 Power Cable Assembly CX-1165/U.
- 1 Power Cable Assembly CX-1166/U.
- 5 fuses, $\frac{1}{4}$ ampere, 250 volts.
- 5 fuses, 5 amperes, 250 volts.
- 5 fuses, 15 amperes, 250 volts.
- 12 Guy Fasteners MX-379/U.
- 12 Guy Plates MX-378/U.
- 1 Headset HS-30-(*)
- 1 insulator, bowl, steatite.
- 18 insulators, strain, tube type NS4B 5224.
- 3 lamps, fluorescent, 20 watts, 110 to 125 volts.
- 2 lamps, incandescent, 15 watts, 115 to 125 volts.
- 1 Mast Base MP-47-A.
- 1 Mast Base MP-65-C.
- 2 Mast Sections MS-49.
- 2 Mast Sections MS-50.

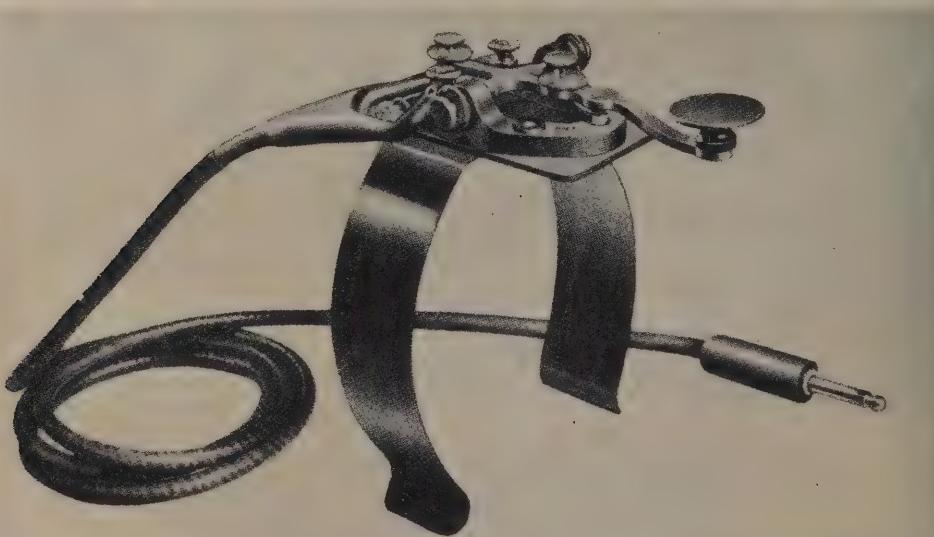


Figure 22. Key J-45 and Cord CD-201-A.

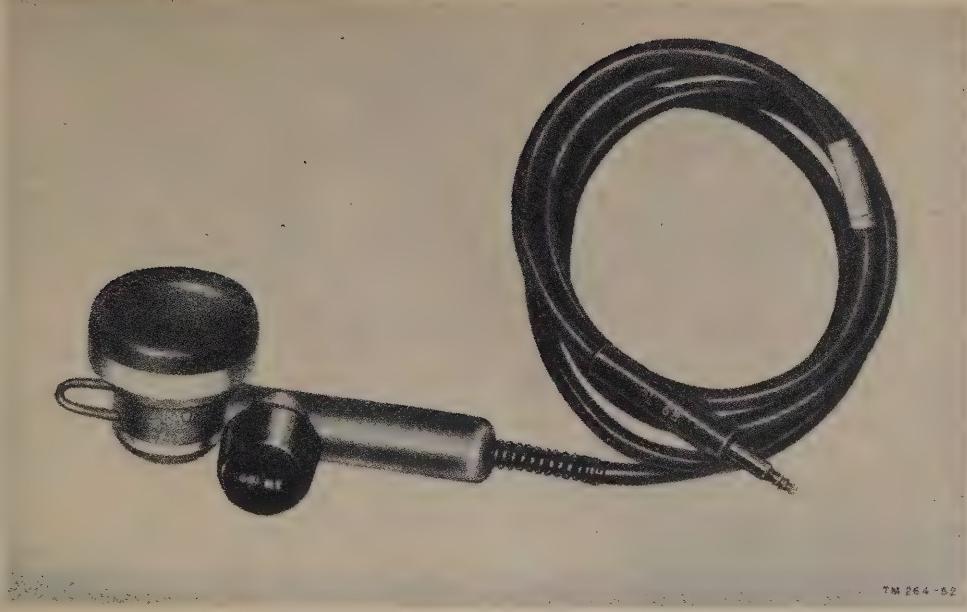


Figure 23. Microphone T-17.

- | | |
|---|--------------------------|
| 2 Mast Sections MS-51. | 30 Fuses FU-37. |
| 2 Mast Sections MS-52. | 10 Fuses FU-64. |
| 2 Mast Sections MS-53. | 4 tubes type 6H6. |
| 4 Mast Sections MS-116-A. | 4 tubes type 6SA7GY. |
| 2 Mast Sections MS-117-A. | 6 tubes type 6SJ7Y. |
| 2 Mast Sections MS-118-A. | 6 tubes type 6SL7GT. |
| 1 Pick-Up Antenna AT-137/MRC-2
(4 ft., 0 in.). | 2 tubes type 6SQ7. |
| 1 Rectifier RA-20-B. | 6 tubes type 6V6GY. |
| 12 Stakes GP-101/U. | 2 tubes type 6Y6G. |
| 3 starters, lamp. | 2 tubes type OD3/VR-150. |
| 1 typing unit, teletypewriter. | 2 tubes type 5R4GY. |
| 1 whip antenna hold-down (receiver). | 4 tubes type 5Y3GT. |
| 1 whip antenna hold-down (transmit-
ter). | 2 tubes type 6SJ7. |

b. RUNNING SPARES FOR RADIO TELETYPE-
WRITER EQUIPMENT.

- (1) Control Unit C-292B/TRA-7:
 - 20 Fuses FU-50.
 - 4 Lamps LM-52.
 - 2 tubes type OD3/VR-150.
 - 2 tubes type 5R4GY.
 - 2 tubes type 6H6.
 - 3 tubes type 6SJ7Y.
 - 4 tubes type 6SL7GT.
 - 4 tubes type 6V6GY.
 - 4 tubes type 6X5GT.
 - 4 tubes type 6Y6G.
 - 1 tube type OC3/VR-105.
- (2) Dual Diversity Converter CV-31B/
TRA-7:



Figure 24. Microphone T-50.

- 4 Lamps LM-52.
- (3) Frequency Shift Exciter O-39B/TRA-7:
- 1 Cord CG-391/U (28 in.).
 - 4 tubes type OC3/VR-105.
 - 2 tubes type 5R4GX.
 - 2 tubes type 6AL5.
 - 2 tubes type 6E5.
 - 2 tubes type 6SA7GT.
 - 3 tubes type 6SJ7.
 - 2 tubes type 6V6GT.
 - 1 lamp, glow, 105 to 120 volts ac, GE #NE-51.



Figure 25. Loudspeaker LS-3 with Cord CD-267.

- 2 lamps, 6 to 8 volts, 0.4 ampere.
 - 2 Lamps LM-52.
 - 2 lamps, neon, 105 to 125 volts, $\frac{1}{4}$ watt, GE #NE-45.
 - 20 Fuses FU-50.
- (4) Miscellaneous:
- 1 Cord CG-389/U.
 - 1 Cord CG-390/U.
 - 1 RF Cable Assembly CG-562/U.
 - 1 Cord CX-954/TRA-7.
 - 1 Cord CX-955/TRA-7.
 - 1 Cord CX-956/TRA-7.
 - 1 Cord CX-957/TRA-7.
 - 1 Cord CX-958/TRA-7.
 - 1 Cord CX-959/T2A-7.
 - 1 Cord CX-961/TRA-7 (red).
 - 1 Cord CX-961/TRA-7 (blue).

- 1 Cord CX-962/TRA-7.
- c. RUNNING SPARES FOR RADIO RECEIVER R-336/GRC-26:
- 5 Fuses FU-27.
 - 1 fuse, cartridge, $\frac{1}{8}$ ampere, Littlefuse #3AG.
 - 1 lamp, neon, 105 to 125 volts, $\frac{1}{4}$ watt, GE #NE-48.
 - 2 Lamps LM-27.
 - 1 tube type 5Y3GT.
 - 1 tube type 6C5.
 - 1 tube type 6F6.
 - 1 tube type 6K7.
 - 1 tube type 6L7.
 - 1 tube type 6R7.
 - 1 tube type 0A2.
 - 1 tube type 6J5.

d. RUNNING SPARES FOR RADIO TRANSMITTER T-213/GRC-26:

- 1 Capacitor CA-423.
- 1 chart set, calibration.
- 1 Coil Unit C-387-D.
- 1 Coil Unit C-388-C.
- 1 Coil Unit C-389-C.
- 1 Coil Unit C-390-C.
- 1 Coil Unit C-447-B.
- 1 Coil Unit C-448-B.
- 1 Coil Unit C-449-B.
- 6 Fuses FU-50.
- 6 fuses, cartridge, 5 amperes, 250 volts, Littlefuse type 3AG, #1358.
- 6 fuses, 20 amperes, 125 volts, plug type, long time delay.
- 12 fuses, 25 amperes, 125 volts, plug type, long time delay.
- 1 Lamp LM-27.
- 2 lamps, incandescent, 120 volts, 6 watts, candelabra screw base.
- 2 tubes type 2A3.
- 1 tube type 6L6.
- 1 tube type 6V6.
- 2 tubes type 100TH.
- 2 tubes type 5Z3.
- 1 tube type 250TH.
- 1 tube type 807.
- 1 tube type 3B28.
- 1 tube type OD3/VR-150.

e. RUNNING SPARES FOR SPEECH AMPLIFIER BC-614-H:

- 1 Lamp LM-27.
- 1 tube type 6J5.
- 1 tube type 6SN7GT.
- 1 tube type 6SQ7.

1 tube type 6SR7.

1 tube type 80.

f. RUNNING SPARES FOR PERFORATOR-TRANSMITTER TT-56/MGC:

12 fuses, plug, 1.6 amperes, 125 volts,
Bussman #7016.

5 tapes, blank recording.

1 ribbon, typewriter, black.

g. RUNNING SPARES FOR TELETYPEWRITER
TT-55/MGC:

1 fuse, plug, 1.6 amperes, 125 volts,
Bussman 7016.

2 ribbons, typewriter, black.

h. RUNNING SPARES FOR RECTIFIER RA-87:

6 fuses, cartridge, 15 amperes, 250
volts.

5 fuses, $\frac{1}{2}$ ampere, 250 volts, Littelfuse
1266.

i. RUNNING SPARES FOR ANTENNA TUNING
UNIT BC-939-A:

1 capacitor, fixed, vacuum, 12 uuf,
Eimac VC-12-12.

j. RUNNING SPARES FOR LINE UNIT BE-77-

A:

2 lamps, neon, 210 to 250 volts, 1/10
watt, Littelfuse #211007.

5 fuses, $\frac{1}{4}$ ampere, 250 volts, Littelfuse
#312.250.

k. RUNNING SPARES FOR POWER UNIT PE-
95-G:

2 belts, fan.

2 belts, engine drive.

1 bowl, fuel filter.

4 clamps, radiator hose.

4 elements, engine oil filter.

3 gaskets, carburetor intake.

4 gaskets, fuel filter bowl.

4 gaskets, fuel pump bowl.

1 gasket, oil filter bowl.

12 plugs, spark.

4 brushes, a-c.

4 brushes, d-c.

10 Fuses FU-42.

l. RUNNING SPARES FOR FREQUENCY METER
BC-221-(*):

1 tube type 6K8.

2 tubes type 6SJ7Y.



Figure 26. Siting Radio Set AN/GRC-26; a possible antenna location.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF RADIO SET AN/GRC-26

29. Siting

a. Choose a flat, well-drained, elevated location (fig. 26) for the installation of Radio Set AN/GRC-26. The tactical situation and the necessity for concealment also must be taken into consideration in selecting an appropriate site. Signals from Radio Set AN/GRC-26 have a greater range if the antenna is high and clear of hills, buildings, cliffs, densely wooded areas, and other obstructions. Depressions, valleys, and other low places are poor locations for radio reception and transmission because the surrounding high terrain absorbs r-f energy. Weak or otherwise undesirable signals may be expected if the set is operated under or close to steel bridges, underpasses, power lines, or power units. Choose, if possible, a location on a hilltop or elevation. Flat ground is desirable. Normally, transmission over water is better than over land. Make sure that drainage is adequate to prevent flooding the interior of the shelter. If the equipment is part of a message center but is not installed within the center, locate the equipment near the message or signal center which it serves. In locating the antenna, avoid obstructions which are 2° or 3° above the horizontal plane of the antenna in the direction of desired transmission. This is approximately 200 to 300 feet at a distance of 1 mile from the antenna.

b. If dual diversity reception is to be used, a clear, level area suitable for the erection of two doublet receiving antennas is required. These antennas should be located as far apart as possible, but not over 1,000 feet. If possible, the broadsides of the receiving antennas should be in positions which are not in the direction of the locally transmitted signals. The broadside of the receiving doublet antenna should be toward the remote transmitter site (fig. 27). For each receiving antenna, it is desirable to have a level area, the size of which is determined by the frequency of operation. At 2 mc, each antenna will require an area of 285 feet by 50 feet, the long dimension being perpen-

dicular to the direction of reception (fig. 27). At 18 mc, each antenna will require an area of only 80 feet by 50 feet. The shelter should be located midway between the two receiving antennas. If a long wire transmitting antenna is desired, an additional level area of approximately 200 feet by 40 feet should be provided. The center of the transmitting antenna should be approximately 30 feet from the shelter.

c. For best operating results, select a location away from steel bridges, power lines, tall trees, or other obstructions. Necessity for cover, however, will not always permit selection of the best location. The site chosen should afford the most practicable compromise of operating and tactical requirements.

d. Shelter S-55/GRC may be removed from the truck if a semifixed installation is desired. In this case, select a well-drained, protected area with sufficient space for antenna erection.

30. Uncrating, Unpacking, and Checking New Equipment

Note. For used or reconditioned equipment, refer to paragraph 42.

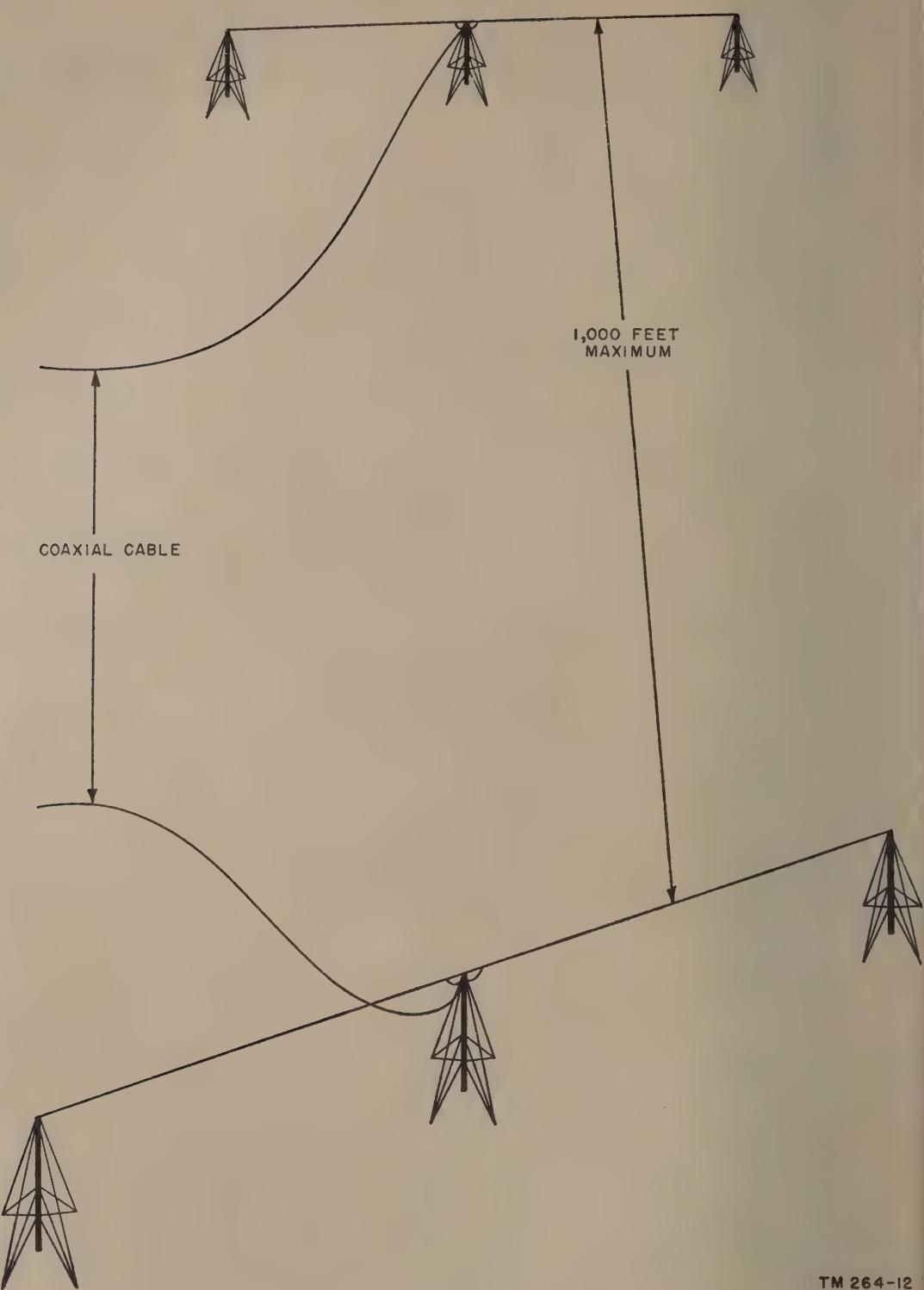
Unpack the equipment carefully and inspect it for possible damage during shipment. Check all components against the packing list packed with the equipment to determine if quantities and types are correct.

a. SHELTER S-55/GRC.

(1) Use nail pullers and crowbars to remove the top of the packing box. The top always must be removed first so that the sides are free for the next step.

(2) Attach one end of a steel cable or strong rope to the rear of a truck. Fasten a hook to the other end of the cable and catch this hook over the top edge of one side of the shelter box. Use the truck to pull this side from the crate. (If a truck is not available, use nail pullers and crowbars.)

DIRECTION OF EFFECTIVE TRANSMISSION
OR RECESSION OF A DOUBLET ANTENNA
OPERATING ON FUNDAMENTAL FREQUENCY



TM 264-12

Figure 27. Radio Set AN/GRC-26, doublet antenna set-up.

- (3) Repeat (2) above to remove the other side and the ends of the box.
- (4) The openings (windows, door, etc.) in the shelter are covered with moisture-vaporproof barrier secured by adhesive tape (fig. 28). To remove the protective material, loosen a small section of the edge with a sharp object such as a screw driver or a chisel. Grasp the adhesive tape and pull it away from the shelter. The barrier will come off with the tape.
- (5) Unfasten the four hold-down assemblies from the crate platform.
- (6) Enter the shelter and carefully remove the shoring (wooden props) and bags of desiccant (silica gel).
- (7) Remove the straps which hold the separately packaged components (antenna tuning unit, masts, etc.) in position on the floor of the shelter.
- (8) Check the contents of each box against the packing list.
- (9) Remove teletypewriter typing mechanisms from the chests, remove the S-hooks from the carriage, and install the units under the covers on the operating table.
- (10) Remove the package of fluorescent lamps stowed underneath the bench and install five lamps in the ceiling fixtures.

b. POWER UNIT PE-95-G INSTALLED IN TRAILER. For complete instructions on crating and unpacking see TM 11-904. Figure 13, TM 11-904, shows one method of packing the power unit.

c. DOMESTIC PACKING. Radio Set AN/GRC-26 may be received in domestic packing cases. The instructions given above apply also to unpacking domestic shipments, except that no external crate is used for the shelter.

Note. Save the original packing cases and containers from both export and domestic shipments; they can be used again when the equipment is repacked for storage or shipment. Remove all protruding nails and bolts.



Figure 28. Shelter S-55/GRC on shipping crate platform.

Section II. INSTALLATION OF RADIO SET AN/GRC-26

31. Installation in Truck

If Radio Set AN/GRC-26 is to be used as a mobile station, Shelter S-55/GRC should be

installed on a 2½-ton, 6 x 6 cargo truck (fig. 1). The following procedure for setting up the radio set for mobile use is recommended:

- a. Remove the canvas cover, roof bows, and

side framing from the truck; drop the tail gate. With all equipment installed, the shelter weighs about 2½ tons. If a suitable hoist is available, lift the shelter by its four lifting straps (fig. 28) and place it on the truck body so that the entrance door is toward the rear of the truck. If no hoist is available, some other method must be devised for raising the shelter to truck level and sliding it on the truck. Skid Equipment MX-157/U, which consists of ropes and two wooden skids, may be obtained for this purpose. Hook the skids to the rear of the truck platform. Attach ropes to the shelter and feed them through the front gate of the truck, one on each side of the cab. Attach the other ends of the ropes to a second truck and pull the shelter up the skids.

b. Attach the hold-down clamps to the truck body sides to hold the shelter firmly in place. There are two clamps on each side of the shelter as shown in figure 28. If the cargo truck has a wooden body, secure the shelter by means of four anchor rings.

c. Couple the trailer to the rear of the truck.

32. Installation of Whip Antennas

a. Remove the antenna bracket assemblies from cartons. Be careful not to lose the mounting hardware contained in the attached cloth bags.

b. To mount three Mast Brackets MP-50 to the front of the shelter (fig. 29), first remove the receptacle housings (with gasketed covers) already mounted on the front end of the shelter.



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Figure 29. Front view of shelter showing receiving antenna mast bases.

c. Assemble Mast Bases MP-65-C as shown in figure 30, using Adapter Kit M-459. Mount them on Mast Brackets MP-50. The large spacing washer is to be located against top of bracket, grounding the ring against the under side. Mount Mast Bracket MP-50 with the four bolts and nuts provided. Remount the receptacle housings in their original location (fig. 29).

d. Mount Bracket MT-657/GRC, the transmitter antenna bracket at the rear of the shelter, using the hardware provided. Apply the calking compound furnished in a metal tube around all bracket and housing mounting bolts

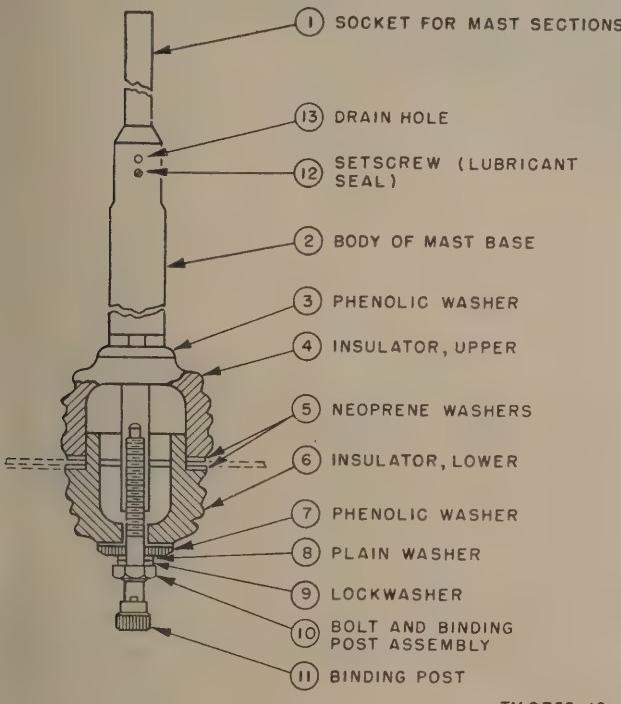


Figure 30. Assembly of Mast Base MP-65-C.

to achieve an effective seal.

e. Mount Mast Base MP-47-A on Bracket MT-657/GRC (fig. 31).

f. Select the following items from the wall cabinet:

- 6 ea-Mast Sections MS-116-A.
- 3 ea-Mast Sections MS-117-A.
- 3 ea-Mast Sections MS-118-A.
- 1 ea-Mast Sections MS-49, MS-50, MS-51, MS-52, and MS-53.
- 2 ea-receiving antenna hold-down guys.
- 1 ea-transmitting antenna hold-down guy.

g. Assemble a receiving whip antenna as follows:

- (1) Screw one Mast Section MS-116-A into another Mast Section MS-116-A. Use two pairs of gas pliers to make the connection tight. Tape the joint with $\frac{3}{4}$ -inch friction tape.
- (2) Repeat this procedure with Mast Sections MS-117-A and MS-118-A. The receiving antenna will be composed of two Mast Sections MS-116-A and one each Mast Sections MS-117-A and MS-118-A.
- (3) Screw Mast Section MS-116-A into Mast Base MP-65-C on the left front corner of the shelter.
- (4) Assemble another receiving antenna by repeating (1) and (2) above. Screw Mast Section MS-116-A into Mast Base MP-65-C on the right front corner of shelter.
- (5) If the radio set is to operate in motion, attach antenna hold-down guys to the receiving antennas at the junction of the third and fourth sections. Pull the antennas down to a forward horizontal position. Secure the other ends of the antenna hold-down guys to the headlight grill of the truck.

h. Screw Mast Section MS-49 into Mast Section MS-50. Use two pairs of gas pliers to tighten the connection. Tape the joint with $\frac{3}{4}$ -inch friction tape. Repeat this procedure with Mast Sections MS-51, MS-52, and MS-53. *In the transmitting antenna, any mast section with a lower number is located above that with a higher number.*

i. Carry the transmitting antenna hold-down guy and the assembled antenna sections on the shelter roof. Screw Mast Section MS-53 into Mast Base MP-47-A. Bend the antenna forward to a horizontal position and attach the antenna hold-down guy rope to the top of Mast Section MS-51. Swing the antenna around to the rear and attach the other end of the antenna hold-down guy rope to the cargo trailer.

33. Semifixed Installations

a. Unwind Power Cable Assembly CX-1165/U (which supplies power to the shelter), and connect the two lugs to the A.C. OUTLET nuts on Power Unit PE-95-G. Connect the other

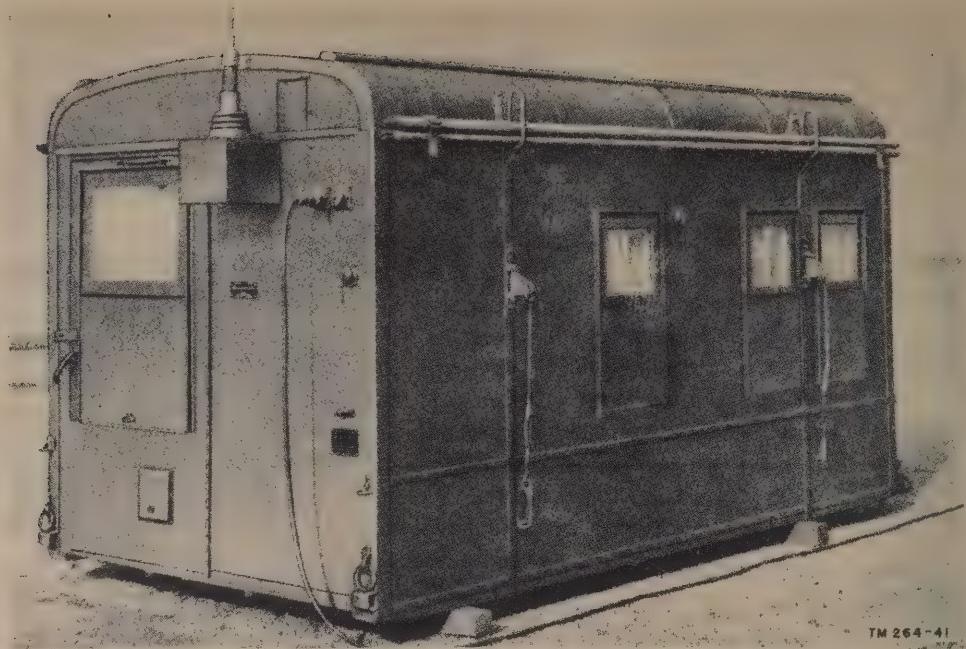


Figure 31. Position of Mast Base MP-47-A and Bracket MT-657/GRC.

end to the power receptacle in the rear of the shelter. If it is desired to locate the power unit at a greater distance from the shelter in fixed installations, attach one end of Power Cable Assembly CX-1166/U to Power Cable Assembly CX-1165/U and the other end to the shelter power receptacle. A 50-foot extension is provided. During operation, always raise the canvas end pieces from the front and rear of the trailer and tie them securely, to allow adequate ventilation and cooling of the power unit.

b. If communication between the cab of the truck and the shelter is desired, set up a Telephone EE-8-(*) in the cab of the truck and one in the shelter. Cut a 15-foot length of Wire WD-1/TT from Wire Dispenser MX-306/G. Connect one end to Telephone EE-8-(*) in the shelter, and pass the wire through the bushing of Mast Bracket MP-50 and into the truck cab to the other Telephone EE-8-(*)�.

c. Two 10-foot copper braid ground straps are furnished with the equipment. In mobile operation, ground the shelter to the truck by fastening one of the straps from the external ground terminal located at the rear of the shelter to the truck body. In semifixed or fixed operation, ground the shelter by driving the grounding stake (provided with the equipment) into the ground and securing the braid to it.

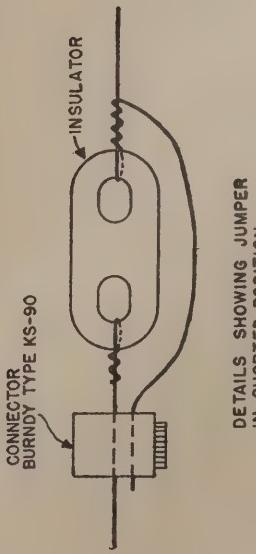
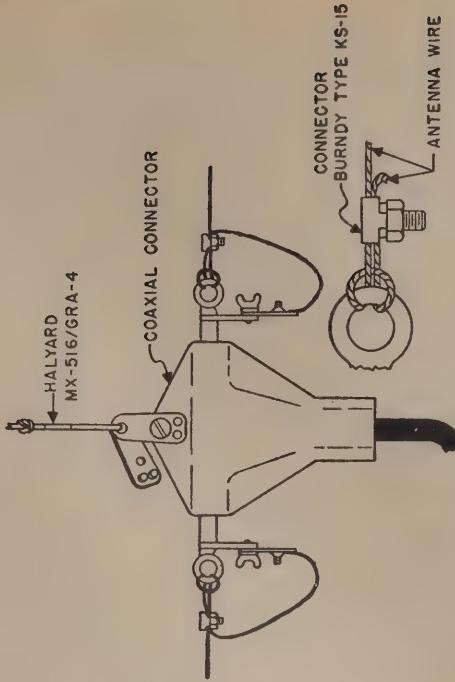
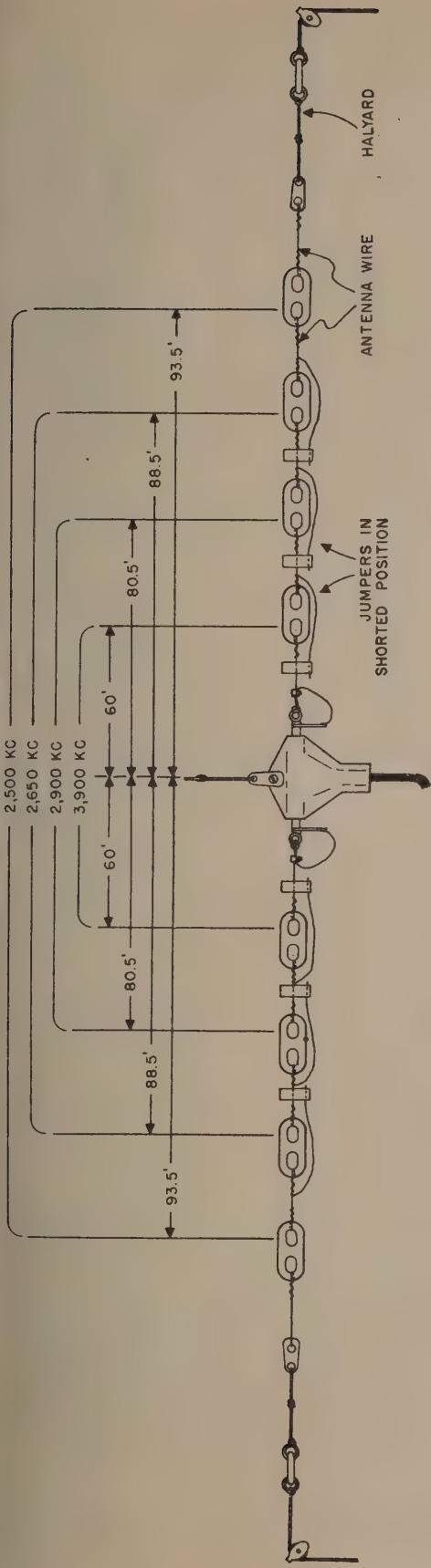
34. Installation of Doublet Transmitting Antenna

a. A doublet transmitting antenna may be used for Radio Set AN/GRC-26 instead of the whip antenna which is normally used. The doublet type is used for semifixed installations and where the greater directivity and signal pick-up of a doublet antenna are desired.

b. Three 40-foot Masts AB-155/U are required to support the antenna at lower frequencies (approximately 2 to 4 mc). At higher frequencies, the length of the antenna is short enough to omit the center mast and use only two supports. The lance poles are particularly useful in mobile-at-halt installations or where an antenna must be set up quickly.

c. The antenna wire is made up of sections of Wire W-1 separated by strain insulators. The sections may be connected by jumpers which will allow preselection of various lengths for operation on different frequencies (fig. 32). Compute the lengths desired for the various antenna sections as follows:

- (1) The antenna is a half-wave doublet designed to operate at the fundamental of the desired frequency, or on any odd harmonic of the fundamental. Figure 33 is a graph of frequency plotted against antenna length



ANTENNA CENTER DETAIL
AT CENTER MAST

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Figure 32. Construction of doublet antenna wire.

for the fundamental, third, fifth, and seventh harmonics. The antenna is normally used on the fundamental wavelength. If operation of the antenna at any of its harmonics is contemplated, consideration must be given to the effective change in the radiation pattern. Only when the antenna is used at its fundamental length with regard to frequency will the radiation pattern be broadside.

- (2) Refer to figure 33 and select the proper antenna lengths for the operating frequencies to be used:

Example: Assume that operation is desired on frequencies of 2,500, 2,650, 2,900, and 3,900 kc. By referring to the graph (fig. 33), it will be found that these frequencies require antenna lengths of 187, 177, 161, and 120 feet, respectively.

- (3) The shortest length antenna must be constructed first. In the case of the above example, the shortest antenna is the 120-foot, 3,900-kc antenna.

- (4) Determine the length of a quarter-wave antenna for the shortest half-wave to be used. In this example a quarter-wave would be $\frac{120}{2} = 60$ feet. Attach one end of the antenna wire to the coaxial cable connector. Attach the other end of the antenna wire to an insulator; make sure that the distance from the center of the coaxial to the end fastened to the insulator is exactly 60 feet as shown in figure 32. Construct the other half of the half-wave antenna in a similar fashion, using the remaining terminal on the coaxial cable connector as a starting point.

- (5) Select the next shortest length of antenna desired, in this case the 161-foot, 2,900-kc antenna. Attach a piece of antenna wire to the unused end of the insulator of the 3,900-kc antenna already constructed. Allow a sufficient length of free wire here which can be used for a jumper connection. Follow the procedure already outlined to arrive at the proper length for a quarter-wave for 2,900 kc: $\frac{161}{2} = 80.5$ feet.

Run out a sufficient length of wire to bring the total length of one side of the antenna to 80.5 feet as measured from the center of the terminating block to the end of the antenna, including in this measurement the length of the insulators. The other side of the antenna is made up in the same manner.

- (6) Each additional lower-frequency antenna is constructed by adding more wire to the antenna already formed. Each antenna length is calculated from the center of the coaxial connector to the end of the antenna being constructed.
- (7) After the various lengths have been determined and constructed, connect the correct jumpers in place as shown in figure 32. Each antenna selected will operate on the fundamental and odd harmonics of the frequency to which it is cut. In the example given in (2), (3), (4), and (5) above, the antenna will be the correct length for the following frequencies:

Fundamental (kc)	3d harmonic (kc)	5th harmonic (kc)
2,500	7,500	12,500
2,650	7,950	13,250
2,900	8,700	14,500
3,900	11,700	19,500

Note. Refer to figure 33 to calculate harmonics versus length of antenna wire.

d. After the antenna wire has been made up, determine the position of the antenna to be erected. Remember that only when the antenna is used at its fundamental length with regard to frequency will the radiation pattern be broadside. A compass is provided for accurate determination of antenna orientation. Stretch the cut antenna wire along the ground in the desired position. Locate the end masts several feet beyond the end insulators. The center mast should be at the coaxial cable connector, offset 3 feet from the line between the two end masts (fig. 34), so that the antenna will clear the center mast. Locate the center mast within 30 feet of the shelter to allow for connection of RF Cable Assembly CG-557/U which is 75 feet long. A center mast may not be required if the

OVER-ALL LENGTH IN FEET

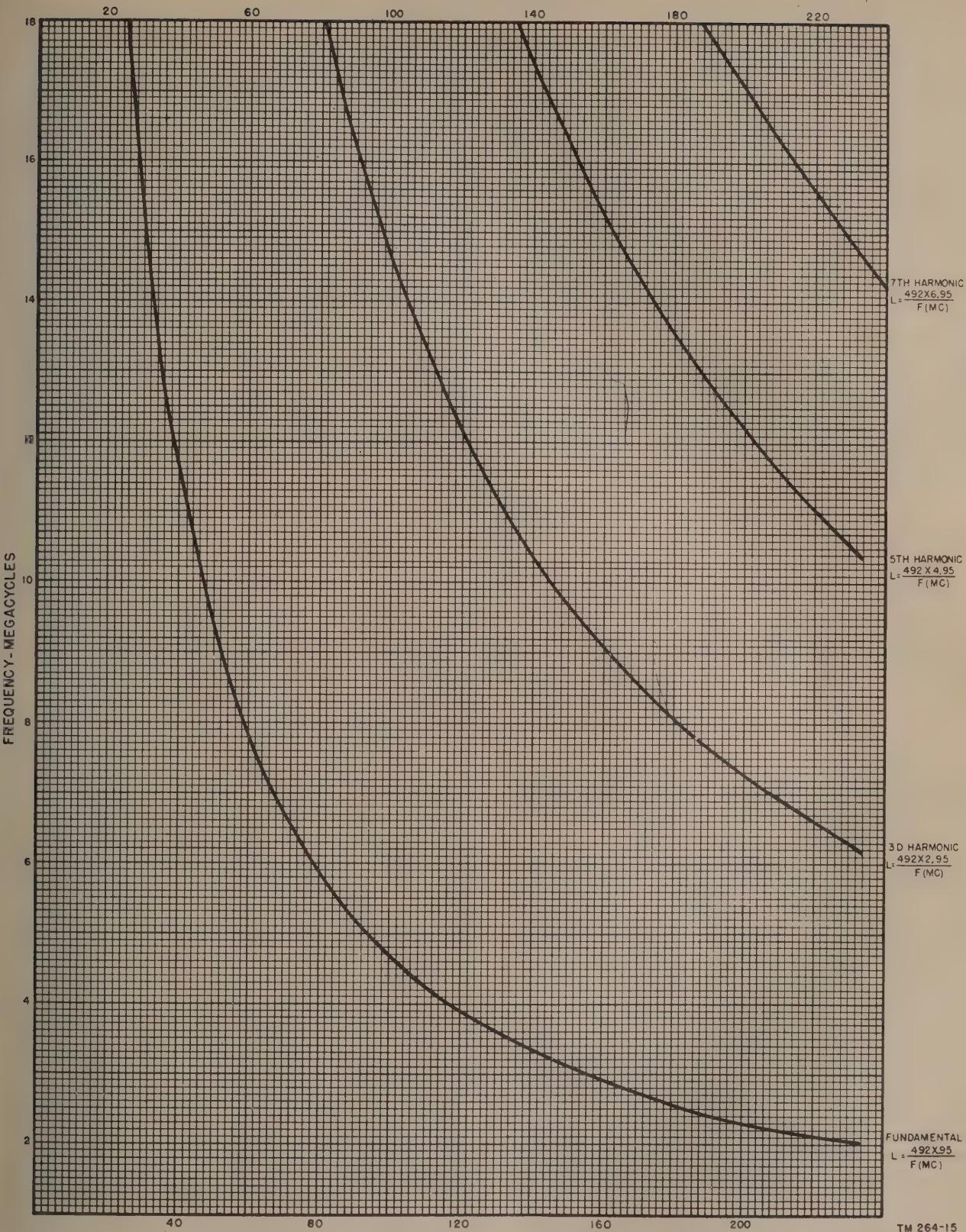


Figure 33. Frequency versus length chart for antenna.

antenna is less than 120 feet long. In this case, use only the two end masts.

e. Place a Mast AB-155/U at each mast location and remove the canvas cover from Carrying Device MX-387/GRA-4. Drive the stake of Mast Base AB-154/U into the ground at the desired mast location, with the swivel end parallel to the antenna wire (fig. 35). If the ground is soft or sandy, place one end plate of the carrying device on the ground and push it down firmly. Then drive the stake on the mast base through one of the tubes in the end plate. Hammer HM-1 is furnished with the mast.

f. Assemble the eight Mast Sections MS-44-A in a line with the female ends of the sections toward the mast base. Slip the end of the nearest section over the first section and place one Guy Plate MX-378/U over the third section.

four Guys MX-383/GRA-4. These guys are color-coded at one end; the top guys (50 feet long) are red, the center guys (40 feet) are white, and the lowest guys (31 feet) are blue. Fasten the four red guys to the top Guy Plate MX-378/U, the four white guys to the center guy plate, and the four blue guys to the bottom guy plate by snapping the fastener at the end of each guy into one of the four holes which are spaced 90° apart on the guy plate. Next, carry the free end of the three back guys to a side stake, to determine their correct length. Fasten these guys to the back stake by means of Guy Fastener MX-379/U. Connect both sets of side guys to their respective side stakes and remove slack by adjusting slide fasteners. Do not make them too tight; the mast may bend. Tie the three front guys together and stretch them along the mast toward the front stake.

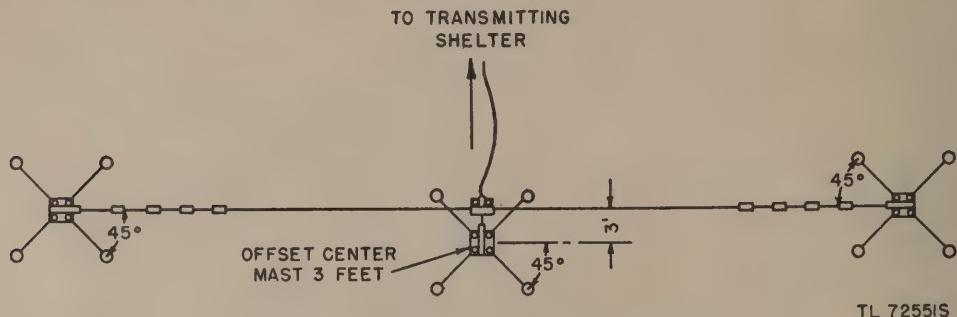


Figure 34. Lay-out of doublet antenna.

Add two additional sections, another guy plate, three more mast sections, and a third guy plate over the last section (fig. 35).

g. Remove four Stakes GP-101/U and four Guy Fasteners MX-379/U from the carrying device (fig. 15). Slip a guy fastener over each stake before it is driven into the ground. Drive one stake (called the back stake) as close as possible to the junction of the fifth and sixth mast sections (25 feet from base). Using the distance between the back stake and the mast base as a reference and a guy rope with which to measure, position the other three stakes so that each is at a 90° angle with respect to the adjoining stake, with the mast base as a central point. If the ground is soft or sandy, use the wooden stakes provided instead of aluminum stakes, and omit the guy fasteners. In this case, the guys should be looped over the stakes.

h. The next step requires four Guys MX-381/GRA-4, four Guys MX-382/GRA-4, and

i. Remove Halyard MX-516/GRA-4 from the carrying device and fasten it by means of the snap fastener to the unused hole in the top guy plate. Slip the halyard rope through the pulley and tie the free ends of the rope near the mast base to keep the rope from running through the pulley during erection of the mast. Figure 35 shows the antenna mast assembly before erection.

j. Assemble additional masts by repeating operations in e through i above.

k. If a center mast is used, fasten the center coaxial cable connector to the halyard.

l. Fasten the halyard on each end mast to the end insulator on the antenna wire.

m. Two men are required to raise the masts. One man takes a position near the mast base and holds the front guys and the halyard. The other man takes a position near the top end of the mast. Then—

(1) The man holding the guys pulls steady-

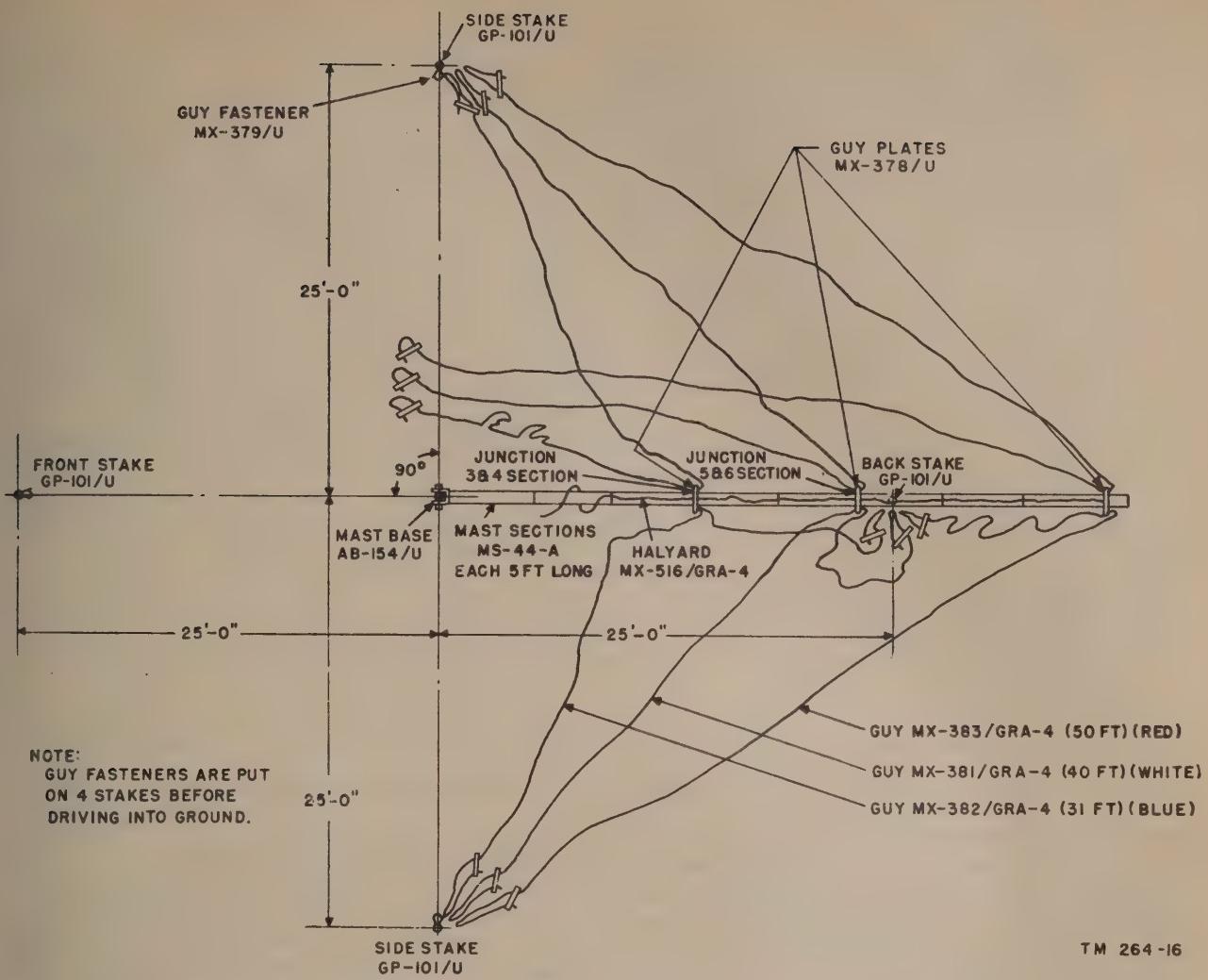


Figure 35. Antenna mast for Radio Set AN/GRC-26, lay-out prior to erection.

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ily on them, keeping slightly more tension on the top guy in such a manner that the mast bows slightly while being raised. Simultaneously, the man at the other end of the mast raises the end from the ground and walks toward the mast base, raising the mast as he walks.

- (2) The man who raised the mast then assists the other man to adjust the front guys to the proper length.
- (3) The rest of the guys are given final adjustment so that the mast is perfectly vertical. If one guy is taken up, the opposite one must be loosened slightly so that the mast will not bow.

n. When all masts are erected, pull the antenna wire into position by means of the halyards. Tie each halyard to the mast to prevent

the weight of the antenna from pulling the halyard back through the halyard pulley. Figure 36 shows a doublet antenna completely erected.

a. After erection of the doublet antenna is completed, be sure to disconnect RF Cable Assembly CG-558/U (which is used in whip antenna operation) from between the transmitter and the antenna tuning unit. Feed the other end of the transmission line, RF Cable Assembly CG-557/U, through the fairlead in the shelter wall and connect it to socket SO-10 on the transmitter, using Adapter M-359 as a coupling.

35. Installation of Doublet Receiving Antennas

a. Doublet receiving antennas are spaced at least three wavelengths apart for satisfactory

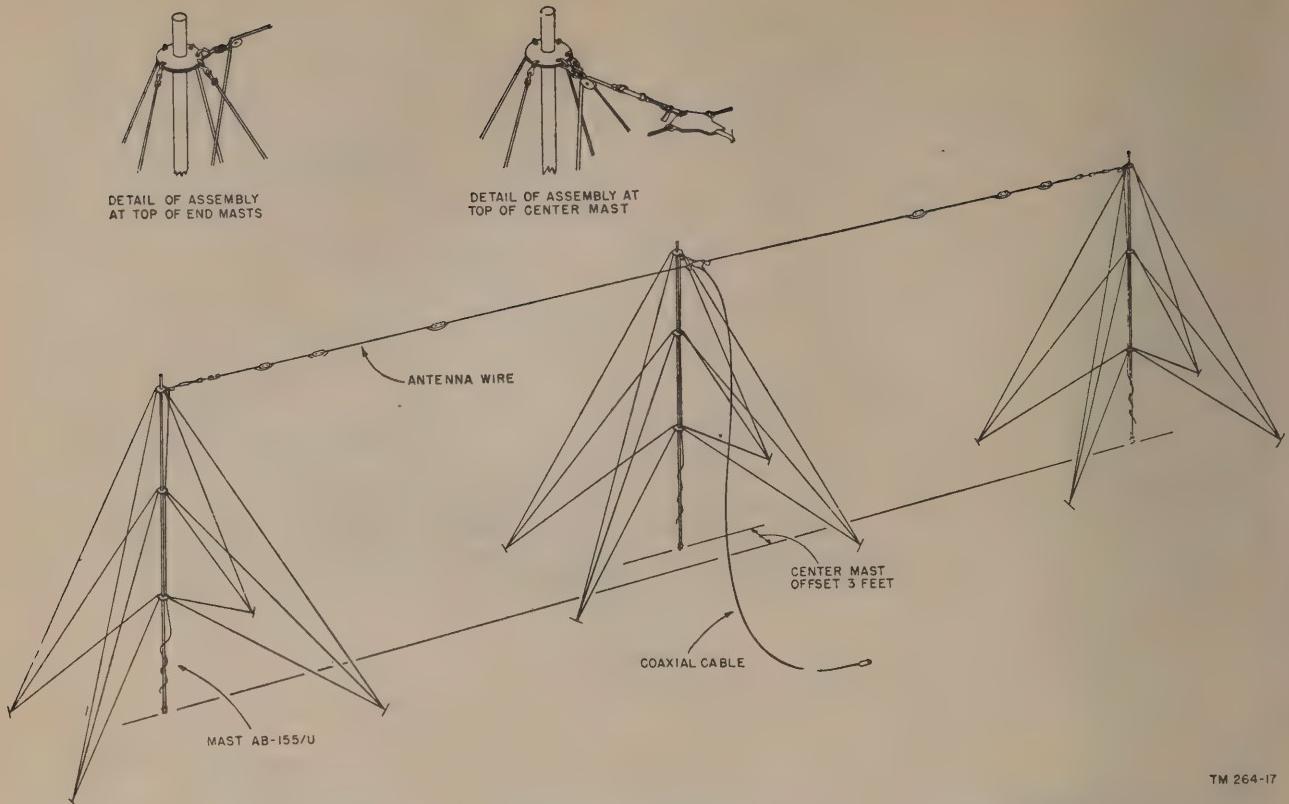


Figure 36. Receiving or transmitting doublet antenna for Radio Set AN/GRC-26.

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diversity reception. At the lowest operating frequencies, the antennas should be spaced 1,000 feet apart. The antennas must be positioned broadside to the received signal as shown in figure 27.

b. Normally three 40-foot Masts AB-155/U are used to support each doublet antenna; however, for operation in the frequency range of 4 to 18 mc, the length of antenna wire is short enough (120 feet or less) to omit the center mast, thus requiring only four masts for a dual diversity receiving antenna installation (two antennas).

c. Construction and erection of the antennas is the same as for the transmitting antenna covered in paragraph 34.

d. After the antenna is erected, disconnect Cords CG-67/MRQ-2 from Mast Bases MP-65-C and Radio Receivers R-336/GRC-26 and withdraw the ends of these cords from the fairleads. Pass the end of each RF Cable Assembly CG-557/U (500 feet) through the shelter wall and connect to the SIG. ANT. connector of each receiver, using Adapter M-359 as a coupling.

36. Other Antenna Installations

In all semifixed installations, when lack of time makes the erection of the 40-foot masts impractical, wooden lance poles may be used to support the doublet antenna wire. The lance poles are forced into the ground in the desired locations and guyed with Rope RP-5 attached to Stakes GP-101/U. If greater height is desired, one of the lance poles may be fastened to the outside of the shelter in a vertical position. In this case the transmitting antenna may be located approximately 60 feet from the shelter. Various systems for erecting antennas may be improvised by using poles, trees, buildings, or other suitable supports. Make use of any natural facilities which are available. The antenna must always be insulated from the supports.

37. Installation of Radio Transmitter T-213/GRC-26

Several tubes for the transmitter are removed for shipment and must be installed before operating the equipment. Remove two

tubes type 100TH from the operating table storage compartment and one tube type 250TH, which is stowed on the shelter floor. Unpack the tubes from containers and place them in the transmitter as follows:

a. Remove the back screen of the transmitter. Insert tubes V-3 and V-4 in the properly marked tube sockets with the pin in the tube socket slot. Turn the tube clockwise until it is locked in position. Carefully connect the plate and grid leads to tube caps. Check that tubes V-1, V-2, V-5, V-6, and V-7 are firmly in place. Replace the rear screen.

b. Open the two hinged doors on top of the transmitter and install tube type 250TH V-16, in the properly marked tube socket with the pin in the tube socket slot. Turn tube type 250TH clockwise until it locks in position. Carefully connect the grid lead to the grid cap on the side, and connect the plate lead to the plate cap on top. Check that tubes V-8 through V-15 are in place. Close the top doors.

38. Installation of Antenna Tuning Unit BC-939-A

Remove Antenna Tuning Unit BC-939-A from the cartons in which it is packed and remove the wrappings. Then mount the tuning unit on top of Radio Transmitter T-213/GRC-26 by means of the four wingnuts on the transmitter.

39. Installation of Dry Batteries

Dry batteries are not furnished with Radio Set AN/GRC-26, but should be requisitioned from a depot or other stock source. Four Batteries BA-30 are required for two Telephones EE-8-(*). One Battery BA-2 and one Battery BA-30 are required for Test Unit I-176. Refer to TM 11-333 and TM 11-2626, respectively, for battery installation instructions. Multimeter TS-297/U requires one Battery BA-42; for installation instructions, refer to TM 11-5500.

40. Placing Storage Batteries in Service

Caution: If electrolyte spills on skin or clothing, wash off immediately with cold water. Apply bicarbonate of soda or ammonia to the affected parts, if available. Examine the storage batteries for Power Unit PE-95-G. A card

attached to each battery gives the manufacturer's instructions for preparing the battery for service. **READ THE MANUFACTURER'S INSTRUCTIONS AND FOLLOW THEM CAREFULLY.**

Example: The six items which follow are an example of the information which appears on a manufacturer's instruction card:

- (1) This battery is of the dry-charged type.
- (2) The electrolyte to be used is diluted sulphuric acid having a specific gravity of 1.256 at 80°F. It is packed in a separate container. In tropical climates, use electrolyte having a specific gravity of 1.200, produced by mixing 10 parts of the 1.265 electrolyte with 3 parts of water. Be sure to use distilled water, or other water known to be suitable for use in a lead-acid storage battery.

Caution: NEVER ADD THE WATER TO THE ACID!

- (3) Remove the vent caps. Remove and destroy the scotch tape which covers the vent holes. Fill each cell with the correct electrolyte to a level $\frac{3}{8}$ inch above the tops of the separators. Replace the vent caps and tighten securely.

Caution: Do not put cold electrolyte into a warm battery, or warm electrolyte into a cold battery; severe damage will result.

- (4) If the battery is filled with 1.200 electrolyte for tropical use, stamp the numeral 1 on the lead top connector at the positive cell, for the information of anyone servicing the battery in the future.
- (5) Before placing the battery in service, allow it to stand from 4 to 12 hours after filling.

Note. In an emergency, the battery may be placed in service 1 hour after it has been filled with the proper electrolyte. *This is not good practice.*

- (6) If possible, give the battery a freshening charge at 6.0 amperes for 16 to 20 hours before placing it in service. It will give satisfactory results without this charge if the battery temperature is above 50°F. If the battery

temperature is below 50°F., it must be given a freshening charge.

41. Connections

Most of the interconnecting cords inside the shelter of Radio Set AN/GRC-26 are installed when the equipment is initially shipped. Check all connections with the cording diagram (fig. 78). Connections to Frequency Meter BC-221-(*) must be made. Plug the power cord into the nearest a-c outlet. Connect Cord CG-

390/U from the PHONES jack of the frequency meter to the FREQUENCY METER IN connector of Frequency Shift Exciter O-39B/TRA-7. Connect Power Cable Assembly CX-1165/U between Power Unit PE-95-G and the shelter. Power Cable Assembly CX-1166/U may be used as a power extension cord if it is desired to locate the power unit farther than 12 feet from the shelter. The cords furnished with Radio Set AN/GRC-26 and the components which they connect are as follows:

Cable No.	Cord	Req No.	Length (ft)	Connects	
				From	To
1	Cord CG-67/MRQ-2*	2	5½	Mast Bases MP-65-C.	Receivers (with Adapter M-359)
2	RF Cable Assembly CG-562/U.....	1	8	Converter.....	Receiver A
2A	RF Cable Assembly CG-562/U**....	1	8	Converter.....	Receiver B
3	Cord CX-955/TRA-7.....	1	7	Converter.....	Receiver A
3A	Cord CX-955/TRA-7.....	1	7	Converter.....	Receiver B
4	Cord CX-954/TRA-7.....	1	6	Converter.....	A-c outlet
5	Special Purpose Cable Assembly CX-1150/U.	1	13½	Converter.....	TT control
6	Special Purpose Cable Assembly CX-1151/U.	1	13½	Converter.....	TT control
7	Cord CD-267.....	2	3½	Control box.....	Loudspeakers
8	Cord CX-959/TRA-7.....	1	6	Control unit.....	A-c outlet
9	Cord CX-956/TRA-7.....	1	6	Control unit.....	TT control
10	Cord CX-957/TRA-7.....	1	6	Control unit.....	TT control
11	Cord CX-958/TRA-7.....	1	6	Control unit.....	TT control
12	Cord CX-962/TRA-7.....	1	4	Exciter.....	A-c outlet
13	Cord CX-961/TRA-7 (red).....	1	4	Exciter.....	TT control
14	Cord CX-961/TRA-7 (blue).....	1	4	Exciter.....	TT control
15	Cord CG-389/U.....	1	6	Exciter.....	Transmitter
16	Cord CG-390/U.....	1	3	Exciter.....	Frequency meter
17	Special Purpose Cable Assembly CX-1152/U.	1	4½	Speech amplifier.....	TT control
18	Cord CD-764.....	1	14	Speech amplifier.....	Transmitter
19	Cord CD-763.....	1	13	Transmitter.....	A-c outlet
20	RF Cable Assembly CG-558/U***....	1	2	Transmitter.....	Antenna tuning unit
21	Wire W-128.....	1	1½	Antenna tuning unit...	Mast Base MP-47-A
22	Special Purpose Cable Assembly CX-1120/U.	1	2½	Perforator.....	TT control
23	Red cord from teletypewriter.....	2	3¾	Teletypewriter....	TT control
24	Black cord from teletypewriter.....	2	3¾	Teletypewriter....	TT control
25	Red cord from perforator.....	1	2¾	Perforator.....	TT control
26	Black cord from perforator.....	1	2¾	Perforator.....	TT control
27	Gray cord from transmitter- distributor.	1	3¾	Transmitter- distributor.	TT control
28	Cord A from Control Box C-345A/MRC-2.	1	1½	Control box.....	Receiver A
29	Cord B from Control Box C-345A/MRC-2.	1	1½	Control box.....	Receiver B
30	Cord CD-201-A (if Key J-45 is used).	1	5¼	Key J-45.....	Speech amplifier or TT contro!
31	Receiver power cord.....	2	6½	Receiver.....	A-c outlet
32	Power Cable Assembly CX-1165/U...	1	12	Power Unit PE-95-G...	Shelter wall or Power Cable Assembly CX-1166/U

Cable No.	Cord	Req No.	Length (ft)	Connects	
				From	To
33	Power Cable Assembly CX-1166/U (if required).	1	50	Power Cable Assembly CX-1165/U.	Shelter wall
34	Pick-up Antenna AT-137/MRC-2.....	1	4	Frequency meter.....	Shelter wall
35	Frequency meter power cord.....	1	6	Frequency meter.....	A-c outlet
36	Cord CD-605.....	1	6½	Headset.....	Exciter, speech, amplifier, frequency meter (as required)

*When doublet receiving antennas are used, Cords CG-67/MRQ-2 are disconnected from Mast Bases MP-65-C and Radio Receivers R-336/GRC-26. RF Cable Assemblies CG-557/U (500 ft.) are brought through the shelter wall and connected to the SIG. ANT. connector on Radio Receiver R-336/GRC-26 with Adapter M-359.

**When receiving on single channel, disconnect channel B (upper) RF Cable Assembly CG-562/U from the converter.

42. Service Upon Receipt of Used or Reconditioned Equipment

a. Follow the instructions in paragraph 30 for uncrating, unpacking, and checking the equipment.

b. Check the used or reconditioned equipment for tags or other indications pertaining to changes in the wiring of the equipment. If any changes in wiring have been made, note the

***When a doublet transmitting antenna is used, RF Cable Assembly CG-558/U is disconnected from Antenna Tuning Unit BC-939-(*) and RF Cable Assembly CG-557/U (75 ft.) is connected with Adapter M-359 to socket SO-10 of Radio Transmitter T-213/GRC-26.

Note. TT control is the designation for Radioteletypewriter Control C-535/GRC-26. Control box is the designation for Control Box C-345A/MRC-2.

changes in this manual, preferably on the schematic diagram.

c. Check the operating controls for ease of rotation. Where lubrication is required (as in Power Unit PE-95-G), refer to the lubrication instructions in individual equipment manuals.

d. Perform the applicable installation and connection procedures given in paragraphs 31 through 41.

Section III. CONTROLS AND INSTRUMENTS

43. General

Haphazard operation or improper setting of the controls can cause damage to electronic equipment. For this reason, it is important to know the function of every control. The actual operation of the equipment is discussed in the next two sections of this manual. Most of the components of Radio Set AN/GRC-26 are

adequately covered by individual technical manuals. For descriptions of the controls and indicating instruments located on the following equipments, see the references indicated:

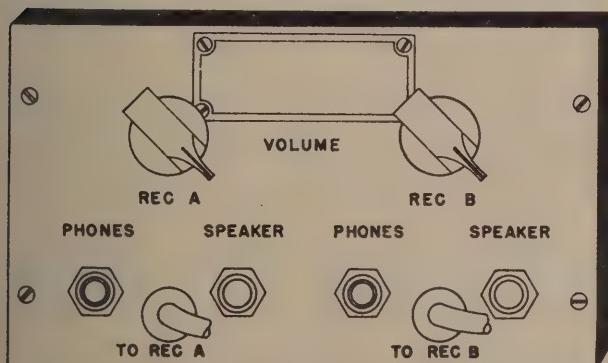


Figure 37. Control Box C-345A/MRC-2, front panel.

Component	Reference
Antenna Tuning Unit BC-939-A.....	TM 11-281
Control Unit C-292B/TRA-7.....	TM 11-278
Dual Diversity Converter CV-31B/TRA-7.	TM 11-278
Frequency Meter BC-221-(*).....	TM 11-300
Frequency Shift Exciter O-39B/TRA-7.	TM 11-278
Line Unit BE-77-A.....	TM 11-359
Perforator-Transmitter TT-56/MGC (TG-26-A).	TM 11-2201
Power Unit PE-95-G.....	TM 11-904
Radio Receiver R-336/GRC-26 (BC-342-(N)).	TM 11-850
Radio Transmitter T-213/GRC-26 (BC-610-(*)).	TM 11-281, TM 11-4057, and TB SIG 220
Rectifier RA-87.....	TM 11-957
Speech Amplifier BC-614-H.....	TM 11-281
Telephone EE-8-B.....	TM 11-333
Teletypewriter TT-55/MGC (TG-7-B).	TM 11-352

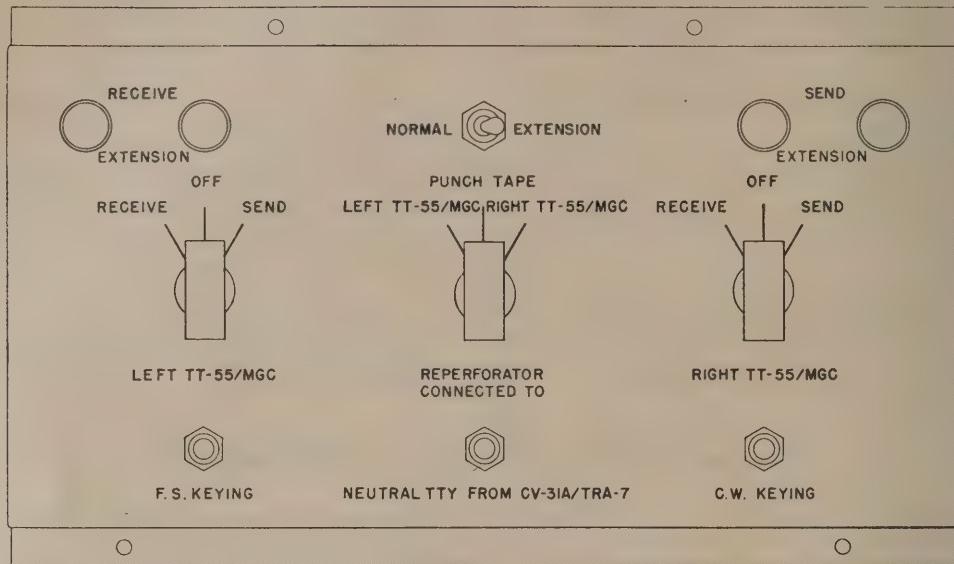
44. Control Box C-345A/MRC-2
(fig. 37)

The controls of Control Box C-345(*)/MRC-2 and their functions are as follows:

Control	Function
REC A control (R-1).....	Potentiometer which controls audio volume of channel A (lower) Radio Receiver R-336/GRC-26.
REC B control (R-2).....	Potentiometer which controls audio volume of channel B (upper) Radio Receiver R-336/GRC-26.

**45. Radioteletypewriter Control C-535/
GRC-26**
(fig. 38)

The controls of Radioteletypewriter Control C-535/GRC-26 and their functions are as follows:



TM 264-19

Figure 38. Radioteletypewriter Control C-535/GRC-26, view of front panel.

Control	Function
NORMAL-EXTENSION switch (S-4).	In NORMAL position, permits operation of teletypewriter equipment in shelter. In EXTENSION position, permits operation with remote teletypewriter equipment over field wire line.
LEFT TT-55/MGC switch (S-1)....	Permits operation of left Teletypewriter TT-55/MGC for receiving or sending, or takes left teletypewriter out of circuit.
REPERFORATOR CONNECTED TO switch (S-2).	In LEFT TT-55/MGC position, permits perforator of Perforator-Transmitter TT-56/MGC to punch tape of message being received or sent on left Teletypewriter TT-55/MGC and to send message when left teletypewriter is switched to SEND.
	In PUNCH TAPE position, permits manual punching of tape, using teletypewriter TT-56/MGC keyboard.
	In RIGHT TT-55/MGC position, permits perforator or Perforator-Transmitter TT-56/MGC to punch tape of message being received or sent on right Teletypewriter TT-55/MGC and to send message when right teletypewriter is switched to SEND.
RIGHT TT-55/MGC switch (S-3)....	Permits operation of right Teletypewriter TT-55/MGC for receiving or sending, or takes right teletypewriter out of circuit.
RECEIVE EXTENSION binding posts (E-1 and E-2).	Permit connection of twisted-pair wire line to remote receiving teletypewriter.

Control

Function

SEND EXTENSION binding posts (E-3 and E-4).	Permit connection of twisted-pair wire line to remote transmitting teletypewriter.
F. S. KEYING jack (J-8).....	Receives Key J-45 for emergency frequency-shift c-w transmission.
NEUTRAL TTY FROM CV-31A/TRA-7 jack (J-9).	Receives red plug or teletypewriter for monitoring copy during relay operation.
C. W. KEYING jack (J-10).....	Receives Key J-45 for emergency c-w transmission.

Section IV. STARTING PROCEDURE AND ADJUSTMENT OF EQUIPMENT

46. Starting Procedure

a. POWER SOURCE. After determining that the connections to Power Unit PE-95-G have been properly made and the controls of the components in the shelter are in the positions indicated in paragraph 58, start the power unit according to instructions given in TM 11-904. Check the output voltage and, if necessary, make adjustments at the power unit so as to obtain between 115 and 120 volts at the shelter. For additional information on the operation of the power unit, see TM 11-904. Set the shelter circuit breakers at the ON position.

b. FREQUENCY SHIFT EXCITER O-39(*)/TRA-7 (fig. 39). Throw the OVEN and AC SUPPLY switches on the front panel to the ON position, at least 2 hours before beginning the initial adjustments and operations. The OVEN and AC SUPPLY lamps should light.

Note. If operation is required before the 2-hour period is completed, the transmitted frequency must be checked every few minutes until a stable condition is obtained. When a readjustment of the transmitted frequency is to be made, the receiving terminal at the other end of the circuit should first be notified to avoid interruption of service.

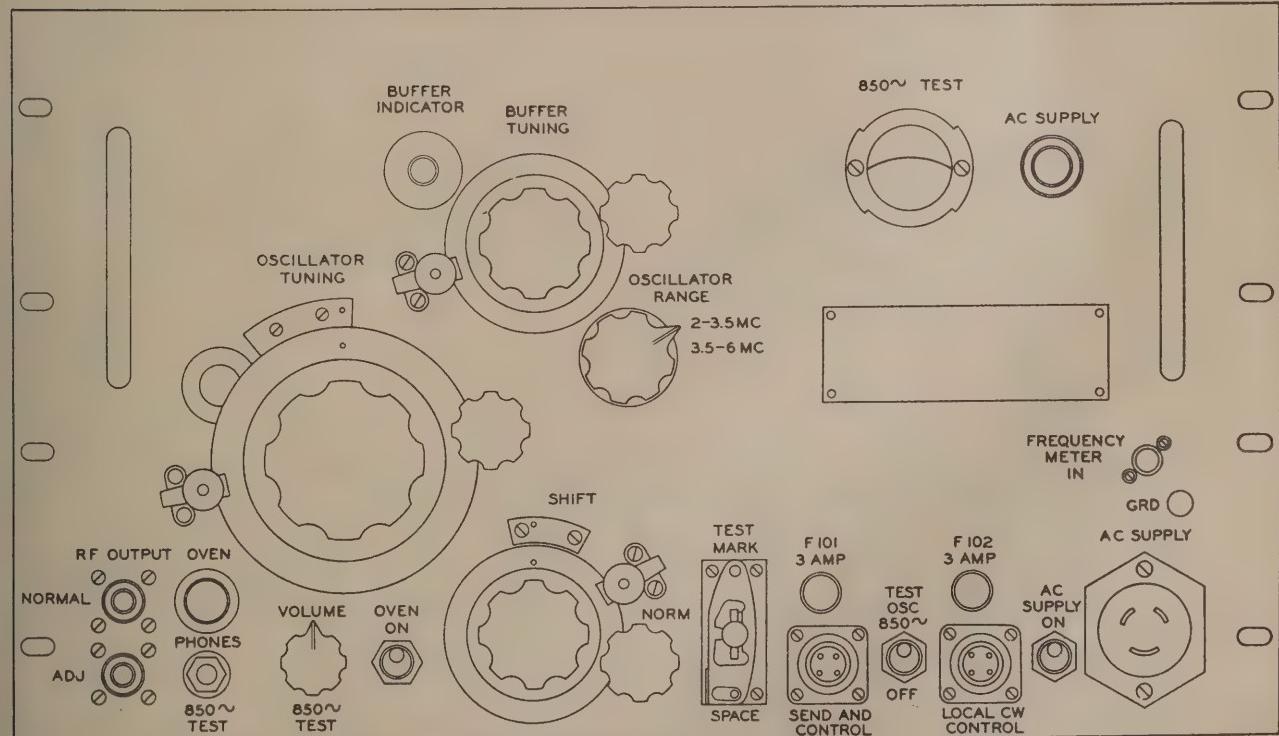


Figure 39. Location of controls on frequency shift exciter.

c. RADIO TRANSMITTER T-213/GRC-26. Turn the FILAMENT POWER switch to the *on* (up) position. Rotate the FILAMENT VOLTAGE control in a clockwise direction until an indication of 5 to 5.3 volts is noted on the FILAMENT VOLTAGE meter. The filaments of the transmitter tubes should always be allowed a warm-up period of not less than 1 minute, before plate power is applied. In cold weather operation,

a warm-up period of from 5 to 10 minutes is required, depending upon the temperature in the shelter.

d. FREQUENCY METER BC-221-(*). Operate the power switch in the power cord to *on*. For complete operation and setting of the frequency meter, refer to TM 11-300. Plug PL-55 must be inserted in the PHONES jack of the frequency meter to complete the filament cir-

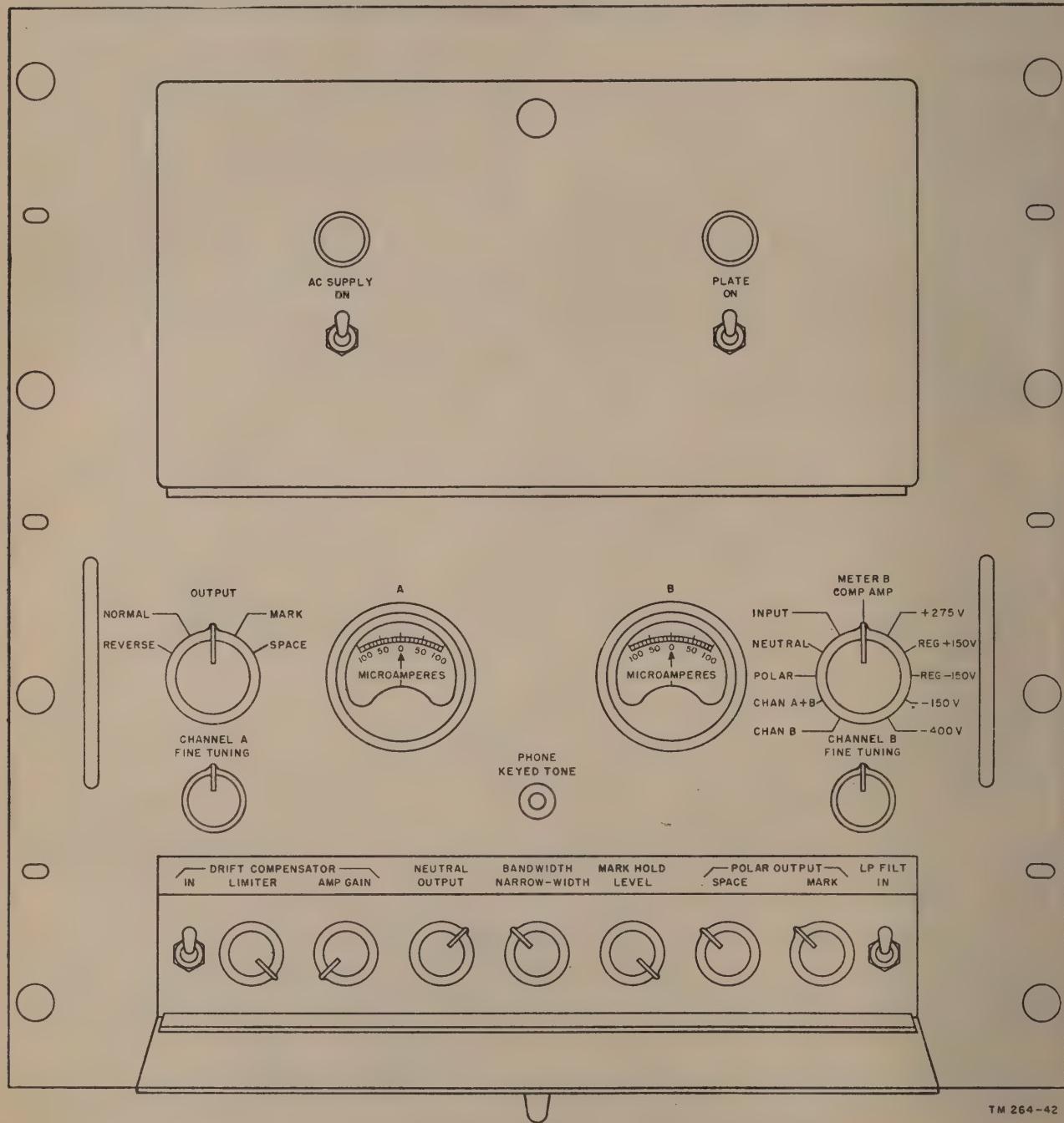


Figure 40. Dual diversity converter controls.

cuit; use Headset HS-30-(*)�.

e. DUAL DIVERSITY CONVERTER CV-31(*)/TRA-7.

- (1) Slide the converter chassis from the cabinet, and check the input connections of transformers T-301 and T-302. (See fig. 32.1, TM 11-278.) For operation with 115 volts ac, connect the input to terminals 1 and 3 of both transformers. Replace the chassis. (All equipment is connected for 115-volt operation.)
- (2) Throw the AC SUPPLY toggle switch to the ON position (fig. 40). The white capped AC SUPPLY pilot lamp should light.
- (3) Throw the PLATE toggle switch to the ON position. The red-capped PLATE pilot lamp should light.
- (4) Turn the METER B switch to the following switch positions, and observe the meter indications. The values given below are for an a-c input voltage of 115 volts. For negative readings, the meter deflection is toward the left, whereas it deflects to the right for positive readings.

Switch position	Meter reading (volts) (approx)
+ 275V	55
REG + 150V	30
REG - 150V	30
- 150V	30
- 400V	80

f. RADIO RECEIVERS R-336/GRC-26. Turn the receivers on by operating the OFF-M.V.C.-A.V.C. switches to the M.V.C. position. Allow a warm-up period of at least 20 minutes. For dual diversity reception, turn on both receivers.

g. CONTROL UNIT C-292(*)/TRA-7.

- (1) Turn the SERVICE switch on the control unit to the FULL DX position.
- (2) Turn the OPERATING switch on the control unit to the NORMAL position.
- (3) Turn the METER switch to the -150 VOLT SUPPLY position.
- (4) Throw the AC SUPPLY toggle switch to the ON position. The white AC SUPPLY indicator lamp should light.

(5) Check voltages as follows:

- (a) With the METER switch in the -150 VOLT SUPPLY position, the meter should indicate -75 ± 5 (to the left of the center position). If the reading is not within these limits, slide the control unit chassis from the cabinet and adjust the slotted shaft control labeled -150V ADJUST, to obtain the correct meter reading.
- (b) Turn the METER switch to the +300 VOLT SUPPLY position. The meter should indicate $+75 \pm 5$ (to the right of the center position). If the reading is not within these limits, adjust the control unit internal slotted shaft control labeled +300V ADJUST, to obtain the correct meter reading.
- (c) Turn the METER switch to the -300 VOLT SUPPLY position. The meter should indicate -75 ± 10 (to the left of the center position). No adjustment of this supply is provided. If the reading is not within these limits, refer to the section on trouble shooting in TM 11-278.

h. RECTIFIER RA-87 (fig. 16). Turn the ON-OFF switch to the ON position.

i. TELETYPEWRITERS TT-55/MGC. Turn the ON-OFF motor switch to the ON position.

j. PERFORATOR-TRANSMITTER TT-56/MGC. Switch the perforator POWER switch on (down). Operate the transmitter-distributor MOTOR ON-MOTOR OFF switch to the MOTOR ON position.

47. Initial Adjustment of Frequency Shift Exciter

The exciter operates on either the assigned operating frequency of the transmitter or one-half or one-fourth the assigned frequency as shown in the following table. The exciter frequency is dependent upon the multiplying factor of the radio transmitter. With the frequency to be transmitted known, determine the frequency control settings for the frequency shift exciter from the calibration chart located in the pocket on the right side of the exciter cabinet. It will be noted from the chart below that the frequency shift from MARK to SPACE

signals is 850 cycles at the exciter, if the transmitter operates on the same frequency as the exciter. It is 425 cycles when the frequency of the exciter is one-half the transmitter frequency, and 212.5 cycles when the exciter frequency is one-fourth the transmitter frequency. The frequency shift of the transmitter carrier is always 850 cycles.

Transmitter frequency (mc)	Multiplication factor	Exciter frequency (mc)	Frequency shift (cycles)
2 to 4....	1	2 to 4....	850
4 to 12....	0.5	2 to 6....	425
12 to 18....	.25	3 to 4.5...	212.5

a. Turn the OSCILLATOR RANGE knob to the frequency range required, as shown on the calibration chart furnished with the exciter unit.

b. Set the OSCILLATOR TUNING dial, the SHIFT dial, and the BUFFER TUNING dial to the required settings. (These are only approximate settings.)

c. Set the VOLUME control to approximately the midpoint position.

d. Operate the TEST key to the MARK position and adjust the BUFFER dial for maximum brilliance of the BUFFER INDICATOR.

48. Adjustment of Radio Transmitter

With the frequency shift exciter tuned to the operating frequency or to a submultiple of the assigned operating frequency, as described in paragraph 47, adjust the radio transmitter as follows:

a. RADIO TRANSMITTER INITIAL ADJUSTMENT.

(1) Select the tuning unit covering the desired frequency range from the wall cabinet. Lift the right-hand cover door, at the top of the transmitter, and firmly insert the tuning unit into the appropriate channel (marked 1, 2, or 3). Locate the tuning unit so that the switch marked MO-XTAL faces the front panel of the transmitter. The table below shows the proper tuning unit to use over any particular operating frequency range.

Note. Install tuning units in descending order of frequency range, from left to right.

Transmitter tuning unit	Frequency range (mc)
TU-47.....	2.0 to 2.5
TU-48.....	2.5 to 3.2
TU-49.....	3.2 to 4.0
TU-50.....	4.0 to 5.0
TU-51.....	5.0 to 6.35
TU-52.....	6.35 to 8.0
TU-53.....	8.0 to 12.0
TU-54.....	12.0 to 18.0

- (2) Set the BAND SWITCH on the transmitter front panel (fig. 41) to the position corresponding to the channel number into which the desired tuning unit was plugged. Insert the plug end of Cord CG-389/U into the XTAL socket of the tuning unit to be used. The MO-XTAL switch should be set to the XTAL position.
- (3) Select a coil unit covering the desired frequency, and plug it into the position under the left-hand door in the top of the transmitter. Adjust the rotatable link for minimum coupling. (Coupling is gradually increased to the proper amount during final adjustment.) The table below shows the proper coil unit to use when operating at a particular frequency.

Note. Better efficiency at higher frequencies is possible by reducing coupling to a point where the required grid excitation current is obtained at comparatively lower transmitter PA PLATE meter readings.

Coil unit	Frequency range (mc)
C-387-B*	2.0 to 2.5
C-387-B	2.5 to 3.5
C-388-A	3.5 to 4.5
C-389-A	4.5 to 5.7
C-390-A	5.7 to 8.0
C-447	8.0 to 11.0
C-448	11.0 to 14.0
C-449	14.0 to 18.0

*Used with Capacitor CA-423.

- (4) Adjust the following controls in accordance with the tuning charts furnished with the transmitter.

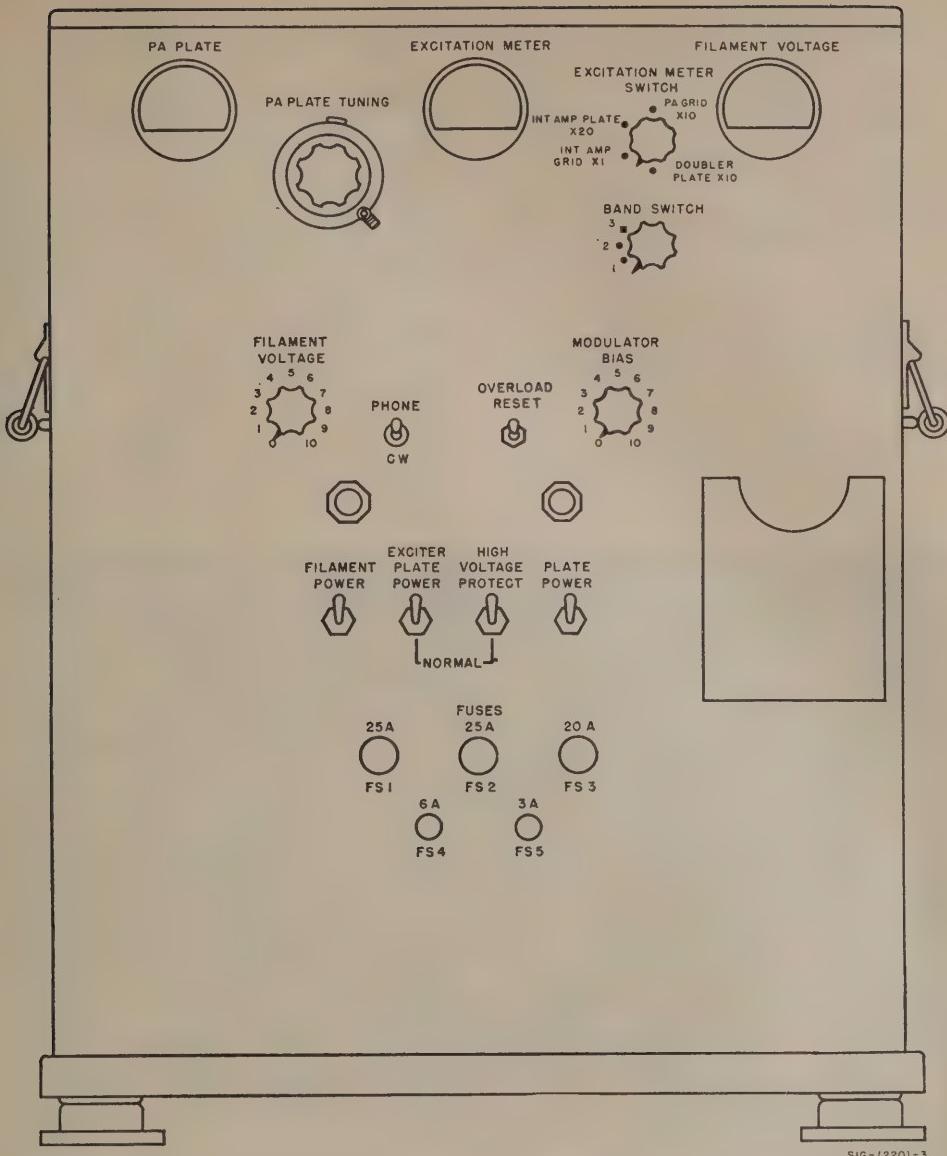


Figure 41. Radio Transmitter T-213/GRC-26, location of controls on front panel.

- (a) DOUB knob (on tuning unit).
- (b) INT AMP knob (on tuning unit).
- (c) PA PLATE TUNING dial.

b. RADIO TRANSMITTER TEMPORARY OPERATING ADJUSTMENTS. The transmitter will now have to be temporarily aligned to the assigned operating frequency. This is necessary so that a portion of the r-f output of the transmitter can be fed back through Pick-up Antenna AT-137/MRC-2 to the frequency meter, for proper adjustment of mark and space output frequencies.

- (1) Operate the TEST KEY on the frequency shift exciter to the MARK position, and adjust the DOUB knob

of the tuning unit in the transmitter for maximum indication on the EXCITATION METER (1 to 8 ma (milliamperes) with the EXCITATION METER SWITCH at the INT AMP GRID position).

- (2) Adjust the INT AMP knob of the tuning unit in the transmitter for maximum indication on the EXCITATION METER SWITCH (60 to 100 ma with the EXCITATION METER SWITCH at the PA GRID position).
- (3) Adjust the PA PLATE TUNING dial on the transmitter for resonant dip on the PA PLATE meter (mini-

mum current). If there is no indication of plate current, check that doors in the top of the transmitter are tightly closed. Push the OVERLOAD RESET switch, which is located on front panel of the transmitter.

49. Adjustment of Frequency Meter BC-221 -(*)

When presetting the frequency meter to the desired transmitter output frequency, be very careful when performing the operations, as they determine the accuracy of the mark frequency of the transmitted signal. The frequency meter should be turned on for a period

noting the nearest crystal check point frequency at the bottom of the page.

d. Connect the headset to the PHONES jack of the exciter. Check the frequency meter at the check point found in c above, in accordance with directions given in TM 11-300. The tone from the meter can be heard through the exciter PHONES jack. Thus, it is not necessary to plug directly into the frequency meter.

e. Readjust gain control on the frequency meter and on the exciter, if necessary.

f. Set the frequency meter to check operating frequency in accordance with directions given in TM 11-300. Transmitting components requiring a frequency check now may be tuned to the exact operating frequency, as determined

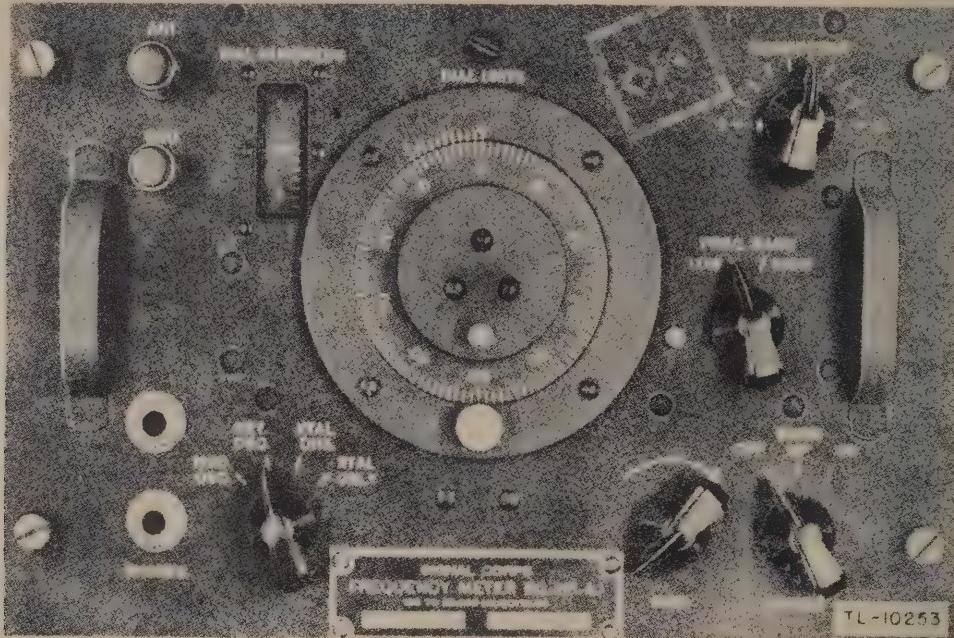


Figure 42. Frequency meter controls.

of at least 10 minutes before operating.

a. Check that the a-c power cord plug from the frequency meter power supply is inserted into an a-c outlet, and that the power switch on the cord is in the *on* position.

b. Check that the plug of Cord CG-390/U is inserted in PHONES jack of the frequency meter. The filament supply line in the frequency meter is not complete if a plug is not inserted in the PHONES jack.

c. After determining the transmitter output frequency to be measured, consult the calibration book on the front of the frequency meter,

by the setting of the frequency meter, by adjusting them until a zero beat is obtained in the headphones.

50. Final Adjustments of Frequency Shift Ex-citer

a. Adjust the OSCILLATOR TUNING dial on the exciter front panel to obtain a zero beat in the headphones. Tune for the zero beat of the strongest signal heard. If a great change in oscillator dial setting is required on the exciter unit, retune the BUFFER dial at the same time.

Check that the shadow on the 850~ TEST tuning indicator is practically stationary, or beats very slowly at the zero beat point.

b. Readjust the BUFFER dial for maximum illumination of the BUFFER INDICATOR and lock dial. Any further readjustments of this dial will affect the oscillator frequency slightly.

c. Repeat adjustments of the DOUB, INT AMP, and PA PLATE TUNING controls on the transmitter if any change is noticed on the EXCITATION METER readings. Check for zero beat again. Readjust the OSCILLATOR TUNING dial if necessary. Throw the TEST key to the SPACE position and the TEST OSC switch to 850~ position. With the above switches in their respective positions, it is possible to adjust accurately the output frequency of the transmitter on space signals to obtain exactly an 850-cycle shift from the marking frequency. When the SHIFT dial on the exciter unit is properly adjusted, a zero beat which is the combination of an audio tone of 850 cycles (the difference frequency between transmitter and frequency meter signals) beating with the 850-cycle signal from the tone oscillator in the frequency shift exciter, will be obtained in the headset.

d. Adjust the SHIFT dial to obtain a zero beat between the two 850-cycle tones. Check the 850~ TEST indicator tube for zero-beat indication. If the SHIFT dial is moved more than a few divisions, an erroneous frequency shift may result.

e. Since any change of the SHIFT dial will affect the oscillator frequency, it will be necessary to readjust the OSCILLATOR TUNING dial. Throw the TEST OSC key to OFF, and the TEST key to the MARK position. Readjust the OSCILLATOR TUNING dial as outlined in a above.

f. Throw the TEST key to the SPACE position and the TEST OSC key to the 850~ position, and repeat the adjustment of the SHIFT dial as in e above.

51. Adjustments of Dual Diversity Converter Output Circuit

a. Set the OUTPUT switch on the converter to the MARK position, the DRIFT COMPENSATOR switch off (down), and the METER B switch to the NEUTRAL position.

b. Adjust the NEUTRAL OUTPUT control knob to give an indication of +60 on meter B.

c. Set the MARK-HOLD LEVEL control to the maximum counterclockwise position. (This switch is hard to operate.) This is the usual operating position except when one-way reversible operation is used, as covered in paragraph 60c.

d. Set the METER B switch to the POLAR position and adjust the POLAR OUTPUT, MARK control knob to give an indication of +25 on meter B.

e. Set the OUTPUT switch to the SPACE position and adjust the POLAR OUTPUT, SPACE knob to give an indication of -25 on meter B.

f. Set the OUTPUT switch to the MARK position. Turn the BAND WIDTH switch to NARROW, unless the drift compensator is used.

52. Control Unit Initial Adjustment

a. RECEIVING TEST LOCAL.

(1) Turn the METER knob to the REC EXT-CURRENT position (fig. 44). Momentarily depress the RECEIVING TEST, SPACE button. The panel meter should indicate zero.

(2) Momentarily depress the RECEIVING TEST, MARK button on the front panel of the control unit. Adjust the EXTENSION CURRENT knob until the meter indicates 75 to the right of zero.

(3) Set the sending teletypewriter ON-OFF switch to the ON position.

(4) Turn the METER switch to the SEND EXT-CURRENT position. The panel meter should indicate 75 to the right of zero. Momentarily depress the SEND-REC BREAK key on the send teletypewriter. The panel meter should read zero.

(5) Turn the METER switch to the BALANCE position. Alternately depress the RECEIVING TEST, SPACE, and the RECEIVING TEST, MARK keys. The meter should indicate equally on either side of the zero position (between 75 and 80 in each case). If the readings are not equal, adjust the BALANCE ADJ potentiometer with a screw driver until the meter deflections are equal.

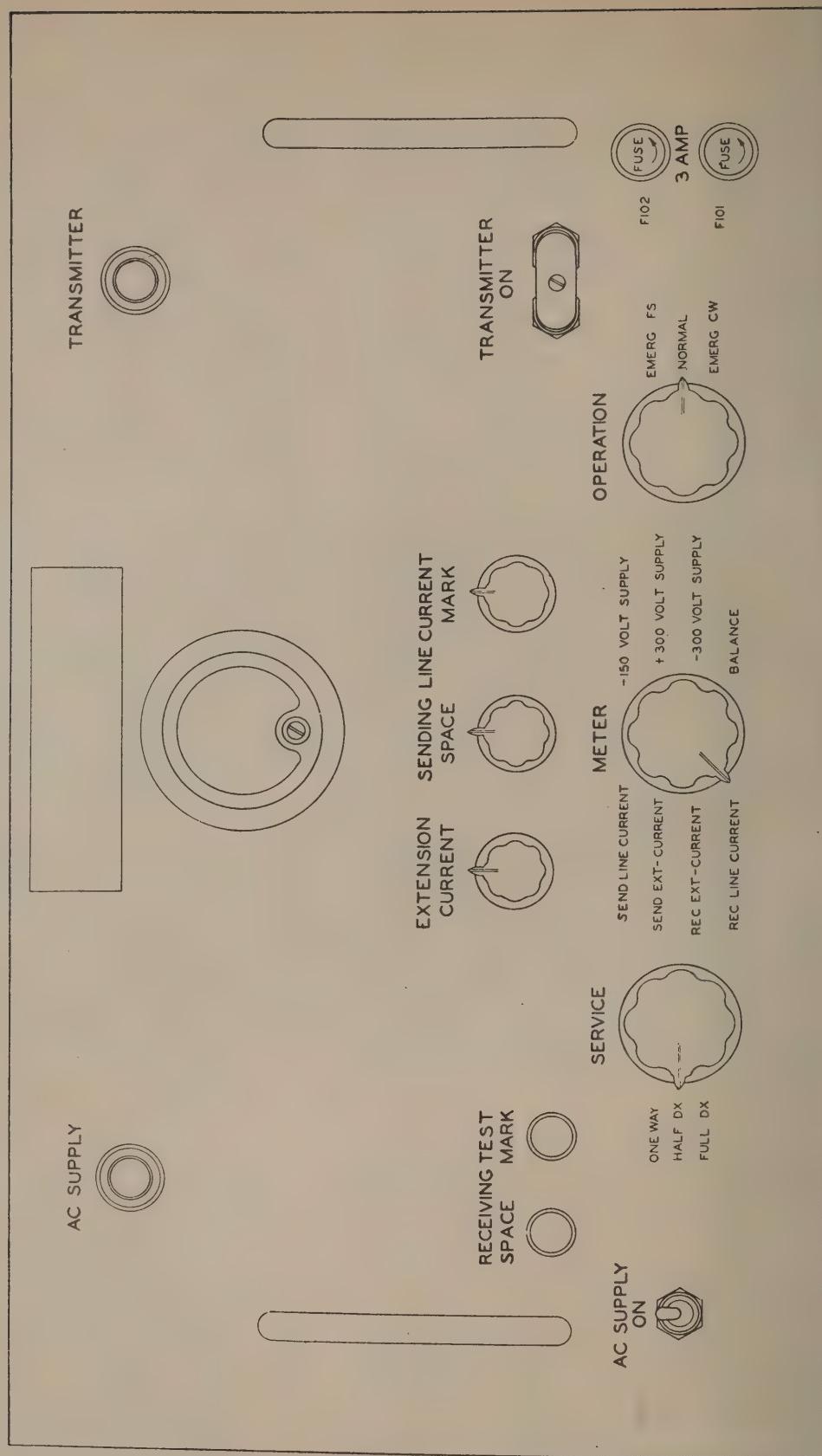


Figure 43. Control unit, front panel controls.

- (6) Turn the meter knob to the SEND LINE CURRENT position.
- (7) Adjust the SENDING LINE CURRENT, MARK control until the panel meter indicates 60 to the right of zero.
- (8) Depress the SEND-REC BREAK key on the sending teletypewriter to the BREAK position.
- (9) Adjust the SENDING LINE CURRENT, SPACE control until the panel meter indicates 75 to the left of zero.
- (10) Release the teletypewriter BREAK key.

b. RECEIVING TEST SIGNALS FROM CONVERTER.

- (1) Turn the converter OUTPUT knob to the MARK position.
- (2) Turn the METER switch on the control unit to the REC LINE CURRENT position, and check that the panel meter indicates between 50 and 85 to the right of center position.
- (3) Turn the converter OUTPUT knob to the SPACE position.
- (4) Check that the control unit panel meter indicates approximately the same to the left of center as indicated in (2) above.
- (5) If the readings in (2) and (4) above are not approximately equal, check the balance of the polar output of the converter on meter B with the METER B switch in the POLAR position.

c. SENDING TEST LOCAL.

- (1) When the transmitter switch is thrown to ON, the green TRANSMITTER indicator lamp should light.
- (2) Turn the METER knob to the SEND LINE CURRENT position and adjust the SENDING LINE CURRENT, MARK control until the panel meter indicates 60 to the right of the center position.
- (3) Depress the SEND-REC-BREAK key on the sending teletypewriter to the BREAK position.
- (4) Adjust the SENDING LINE CURRENT, SPACE control until the panel meter indicates 75 to the left of the center position. Release the teletypewriter SEND-REC-BREAK key.

53. Final Adjustment of Equipment

a. Throw the control unit TRANSMITTER switch to ON. With the exciter TEST key at NORM and the TEST OSC switch at the OFF position, readjust the OSCILLATOR TUNING dial until a zero beat is heard in the headphones and is indicated by the 850~ TEST indicator tube. (Do not retune the BUFFER at this time.)

b. Throw the exciter TEST OSC switch to the 850~ (on) position and send a space signal by pressing the RECEIVING TEST, SPACE button of the control unit. Adjust the SHIFT dial until a zero beat is obtained between the two audio tones (850 cycles) and is indicated by the 850~ TEST indicator tube.

c. Operate the TEST OSC switch to OFF.

d. Press RECEIVING TEST, MARK button of control unit to send mark signal. If zero beat is not heard in the headset, slightly readjust the OSCILLATOR TUNING dial to obtain a zero beat.

e. Repeat the procedures in b, c, and d above until proper conditions are obtained.

f. After these adjustments have been made, proceed with the following:

(1) Turn the transmitter off by operating the FILAMENT POWER switch to the off (down) position.

(2) Send RY tape signals.

g. Set radio receivers to correct band and frequency to receive signal being radiated by exciter. If radiated signal is not sufficiently strong, remove Cord CG-389/U from exciter and attach a short piece of wire to the center contact of RF OUTPUT jack to act as an antenna.

Note. This test will give satisfactory results only when the exciter is tuned for a transmitter frequency of 2 to 4 mc. Otherwise, the exciter frequency shift will be less than 850 cycles.

h. Set the converter METER B switch to the INPUT position and set the OUTPUT switch to the MARK position. Turn on the receiving teletypewriter and check that the teletypewriter holds.

i. Set the OUTPUT switch to the SPACE position and check that the teletypewriter runs open. Return the OUTPUT switch to the MARK position.

j. Turn the VOL control (fig. 44) on Channel A receiver to maximum gain and the VOL control on Channel B receiver to minimum gain.

k. Check on both receivers to see that the OFF-M.V.C.-A.V.C. switch is on M.V.C.; that the C.W.-OSC. switch is OFF; and that the CRYSTAL PHASING control is turned fully clockwise to the OUT position. Adjust the ALIGN INPUT control of Channel A receiver to obtain maximum deflection on meter B.

l. Tune Channel A receiver. Use the c-w oscillator of the receiver, if necessary. Then turn the C.W.-OSC. switch to the OFF position and leave it off for all subsequent operations.

m. Adjust the VERNIER control of the Channel A receiver until the miscellaneous kicks on meter A center around zero and the reading on meter B, showing the INPUT level, is at maximum.

n. Realign the ALIGN INPUT control so that a maximum input level is indicated on meter B.

o. Check that the DRIFT COMPENSATOR switch in the converter is in the out (down) position.

p. Set the OUTPUT control to REVERSE.

q. Check that teletypewriter signals are being received without error.

r. Repeat procedures in *i* through *q* above for the Channel B receiver.

s. Adjust the equipment with the drift compensator in by proceeding as follows:

- (1) Reduce volume of Channel B receiver and increase volume of Channel A receiver.
- (2) Set the DRIFT COMPENSATOR switch to the IN position.
- (3) Turn the OUTPUT control to NORMAL.
- (4) Adjust the Channel A receiver VERNIER control so that the meter A readings center at zero.
- (5) Turn the METER B switch to COMP AMP position.
- (6) Check that the LIMITER control is in the full clockwise position. Turn the AMP GAIN knob fully counterclockwise and then turn it very slowly clockwise while observing meter B for irregular deflections or kicks. This adjustment is very critical. Set the knob at the point where the kicks are a minimum and the meter needle is essentially steady at zero.
- (7) Turn the METER B switch to CHAN A + B position.

(8) Operate the exciter TEST key to the MARK position.

(9) Check that converter meter B indicates approximately 70 to the right of zero. Turn the LIMITER control counterclockwise until the meter B reading just starts to decrease. This is the proper position for the LIMITER control.

(10) Operate the exciter TEST key to the SPACE position.

(11) Check that meter B reads approximately 70 to the left of zero.

(12) Restore the exciter TEST key to the NORM position.

t. Check the copy on the receiving teletypewriters. Adjust the rangefinder of the teletypewriter if necessary, using TM 11-352 for reference.

u. Check neutral d-c loops as follows:

- (1) Set the converter OUTPUT switch to the MARK position.
- (2) Turn the METER B switch to NEUTRAL.
- (3) Adjust the NEUTRAL OUTPUT knob until meter B indicates 60 to the right of zero.
- (4) Restore the OUTPUT switch to NORMAL.

v. Send tape signals and check the teletypewriters for proper copy. Adjust the margin (TM 11-680) on the teletypewriters, if necessary.

w. Reduce the volume of the Channel A receiver to zero, increase the volume of the Channel B receiver, and tune the Channel B receiver VERNIER control so that the meter B readings center at zero (METER B switch set at CHAN B).

x. Check that receiving teletypewriter is copying correctly.

y. Turn the VOL control of the Channel A receiver fully clockwise. Turn the VOL control of the Channel B receiver until readings on meter A and meter B are approximately equal.

z. Check that the receiving teletypewriter is copying correctly. Then reconnect Cord CG-389/U to RF OUTPUT jack of exciter.

54. Tuning to Distant Transmitter Frequency

The adjustments given in *a* below will permit the operator to tune the receiving equipment prior to the time contact is scheduled

with the distant station. If time does not permit preliminary tuning, omit *a* below and proceed directly to *b* below.

a. PRELIMINARY TUNING.

(1) Frequency Meter BC-221-^(*) may be used as a reliable signal source for tuning Radio Receiver R-336/GRC-26. Set the frequency meter to the desired frequency by the methods described in TM 11-300. Disconnect Pick-up Antenna AT-137/MRC-2 from the frequency meter. Connect one end of a length of wire to the ANT. binding post (fig. 42) of the frequency meter and loosely couple the other end of the same wire to the ALT. SIG. ANT. binding post of the receiver to be tuned. Loose coupling is obtained by winding the insulated wire around the posts without making contact between an uninsulated part of the wire and the ALT. SIG. ANT. binding post.

Note. Connect the signal only to one receiver at a time.

- (2) Turn the BAND CHANGE switches of both receivers to the band covering the scheduled frequency. Set the FREQUENCY dial of the receivers to the scheduled frequency.
- (3) Turn the CRYSTAL PHASING control of both receivers to the OUT position. Set the VOL control of the Channel A receiver at the maximum (clockwise) position and the C.W.-OSC. switch to the OFF position. Set the VOL control of the channel B receiver to the minimum position (counterclockwise) and the C.W.-OSC. switch to the OFF position.
- (4) Turn the METER B switch on the converter unit to the INPUT position and retune the VERNIER control on Channel A receiver.
- (5) Peak the meter B reading at 50 or higher by tuning the VERNIER control and rotating the ALIGN INPUT control of the Channel A receiver. Attenuate the signal by rotating the VOL control on the Channel A receiver counterclockwise, if necessary.
- (6) Set the CHANNEL A, FINE TUN-

ING control of the converter unit to the straight up position.

- (7) Retune the VERNIER control of the Channel A receiver very carefully until the needle on meter A rests on zero, between two closely spaced off-scale deflections. (The input level shown on meter B with the METER B switch at the INPUT position should remain high.) The zero reading indicates the exact center of the converter unit discriminator circuit output. If, after careful tuning, this condition cannot be obtained, refer to section XV, TM 11-278.
- (8) Make certain the Channel B receiver is tuned to the same frequency as the Channel A receiver.
- (9) Reduce the VOL control setting on the Channel A receiver to a minimum, and increase the VOL control setting to a maximum (clockwise) on the Channel B receiver.
- (10) Peak the meter B reading at 50 or higher by tuning the VERNIER control and rotating the ALIGN INPUT control of the Channel B receiver. (Attenuate the signal by rotating the VOL control on the Channel B receiver counterclockwise, if necessary.)
- (11) Switch METER B to the CHAN B position and set the CHANNEL B, FINE TUNING control of the converter to the straight up position.
- (12) Retune the VERNIER control of the Channel B receiver very carefully until the needle on meter B rests on zero, between two closely spaced off-scale readings.
- (13) Switch METER B to the INPUT position. The reading should be 50 or higher. If not, repeat step (12) above. If this condition can not be obtained, refer to section XV, TM 11-278.
- (14) Throw the DRIFT COMPENSATOR switch to the off (down) position, and throw the LP FILTER switch to IN.
- (15) Check that meter B (METER B switch in CHAN B position) deflects to the right when the CHANNEL B, FINE TUNING control is turned to the right, and that it deflects to the

- left when the CHANNEL B, FINE TUNING control is turned to the left.
- (16) Set the OUTPUT control to the NORMAL position.
 - (17) Connect a headset to the PHONES KEYED TONE jack on the converter front panel, and note that when the CHANNEL B, FINE TUNING control is turned to the left or right to get the meter B readings (METER B switch in CHAN B position) indicated below, a tone is or is not heard in the headset as indicated.

OUTPUT switch position	Meter B reading	Tone in headphones
NORMAL.....	-50	On
NORMAL.....	+50	Off
REVERSE.....	-50	Off
REVERSE.....	+50	On

- (18) Adjust the drift compensator circuit as follows:
 - (a) Check that the fine tuning controls are in the straight up position.
 - (b) Check that the receivers are properly tuned. Reduce the volume of the Channel B receiver.
 - (c) Set the DRIFT COMPENSATOR switch to the IN position.
 - (d) Turn the OUTPUT switch to the NORMAL position, if the receivers are on band A, B, or C. Turn the OUTPUT switch to the REVERSE position, if the receivers are on band D, E, or F.
 - (e) Set the BAND WIDTH switch to WIDE.
 - (f) Set the LP FILTER switch to IN.
 - (g) Turn the METER B switch to the CHAN A + B position, and turn the AMP GAIN control to approximately the straight up position and the LIMITER control fully clockwise.
 - (h) Check that the converter output can be changed from a steady mark signal (about +70 on meter B) to a steady space signal (about -70 on meter B) or vice versa by a fast movement of the CHANNEL A, FINE TUNING control from one side to the other. If the meter B readings will not stay on the space

side (left), turn the AMP GAIN control clockwise and repeat the foregoing check. The AMP GAIN control will be set more exactly during reception of a keyed teletype-writer signal.

- (i) Slowly turn the LIMITER knob counterclockwise until the indication on meter B starts to drop below 70. Set the knob at the point where the meter reading just barely starts to drop.

b. FINAL TUNING.

- (1) Turn on the C.W.-OSC. switch of the Channel A receiver and reduce the volume control of the Channel B receiver to minimum.
- (2) Tune in the desired station by ear; locate the signal at the center of the i-f pass band.
- (3) Turn off the C.W.-OSC. switch of the Channel A receiver.
- (4) Reduce the volume of the Channel A receiver if the input is more than 100 on meter B (with the METER B switch set at INPUT position).
- (5) Slowly retune the Channel A receiver while observing meter A of the converter.

Note. The significance of the meter deflections, with respect to receivers having an h-f oscillator set above the carrier or set below the carrier, is as follows:

Frequency of h-f oscillator	Meter deflection for a mark signal
Above carrier.....	To the right.
Below carrier.....	To the left.

- (6) Check to see that meter A deflects to the right and to the left of zero for miscellaneous keying signals; these deflections being of approximate equal plus and minus values when the receiver is properly tuned.
- (7) If the distant station transmits a steady mark, tune the Channel A receiver until the meter A deflection is approximately 50 (for a frequency shift of 850 cycles).
- (8) Reduce the volume of the Channel A receiver and increase the volume of the Channel B receiver.

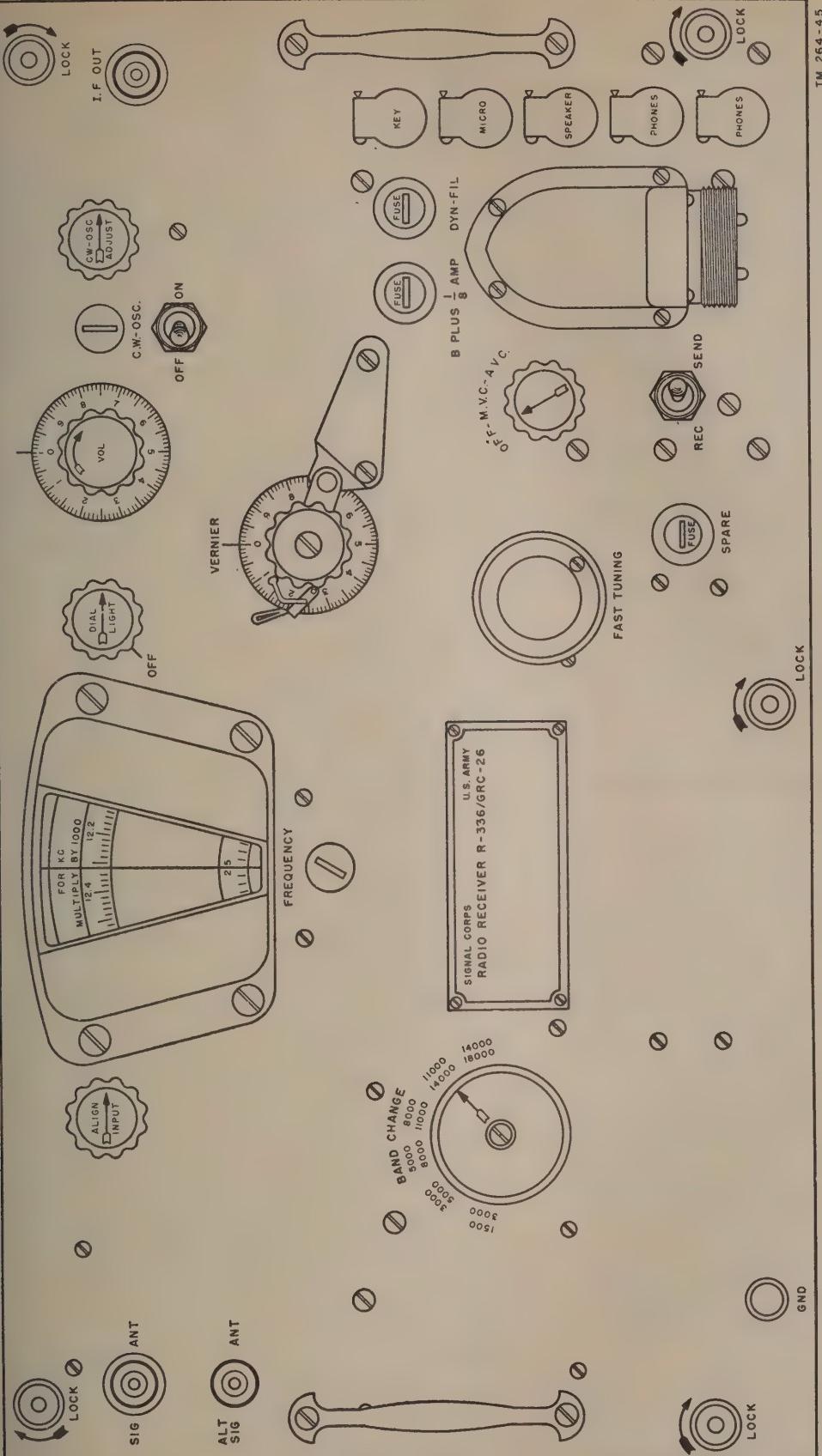


Figure 44. Location of controls on radio receiver.

- (9) Slowly tune the Channel B receiver while observing METER B (set to CHAN B).
- (10) Check that meter B deflects to the right and to the left of zero for miscellaneous keying signals; these deflections being of approximate equal plus and minus values when the receiver is tuned properly.
- (11) If the distant station transmits a steady mark signal, tune the Channel B receiver until the meter B deflection is approximately 50 (for a frequency shift of 850 cycles).
- (12) Increase the volume of the Channel A receiver to maximum with the distant transmitter sending miscellaneous keying signals; adjust the volume of the Channel B receiver to make the maximum swings of meter A and meter B equal (with METER B switch at CHAN B position).
- (13) Check that each meter averages near zero when signals are received over a considerable time.

55. Adjustment of Output Control Circuit

a. DRIFT COMPENSATOR FEATURE DISCONNECTED.

- (1) The drift compensator feature need not be used if the i-f outputs of the Channel A and Channel B receivers remain stable. A sufficiently stable output is indicated if it is not necessary to retune the receiver more often than once an hour.
- (2) Do not use the drift compensator feature if weak r-f signals are received with prevailing high noise levels. Maintain accurate tuning at these times by constantly monitoring the output of the converter.
- (3) Check that the DRIFT COMPENSATOR switch is off (down) and that the AMP GAIN knob is not set beyond its midposition.
- (4) Turn the OUTPUT knob to the position which provides mark and space signals of proper polarities, as indicated in the following table:

Deflection of meters A and B for a mark signal	Position of OUTPUT switch
Right.....	REVERSE.
Left.....	NORMAL.

- (5) Connect a headset to the PHONES KEYED TONE jack on the front panel of the converter, and verify that distinct tones are heard. Distinct tones indicate the absence of noise peaks or distortion arising from improper tuning.
- b. DRIFT COMPENSATOR FEATURE CONNECTED.
- (1) Turn the DRIFT COMPENSATOR switch to the IN position.
- (2) Turn the OUTPUT switch to a position which is opposite to that used when the drift compensator feature is disconnected, as follows:

Deflection of meters A and B for a mark signal	Position of OUTPUT switch
Right.....	NORMAL.
Left.....	REVERSE.

- (3) Turn the METER B switch to the COMP AMP position.
- (4) Turn the AMP GAIN knob fully counterclockwise and then, when miscellaneous signals are being received, slowly turn the knob clockwise while observing meter B for a minimum of irregular deflections or kicks. A tapered control is provided, and the normal setting will usually be 30° or 40° from the counterclockwise stop for 850-cycle frequency shift. Set the AMP GAIN knob in a position which provides keyed tone output from the converter and results in minimum kicks on meter B. A more definite setting of the AMP GAIN knob may be found if the LIMITER knob is first turned fully clockwise.
- (5) Turn the METER B switch to the CHAN A + B position.
- (6) Verify that the deflection of meter B on a steady mark signal is 70 to the right of zero and, during a steady mark signal, reset the LIMITER knob to a position which causes the 70 in-

dication to just start decreasing.

- (7) Connect a headset to the PHONES KEYED TONE jack and verify that clear distinct tones are produced. Distinct tones indicate the absence of noise peaks or distortion arising from improper tuning.

56. Mark-hold Feature

The mark-hold feature is provided to maintain a steady marking condition automatically if the signal level drops below the noise level or disappears for any reason. It must be used for one-way reversible service. For full-duplex or half-duplex service the carrier-control mark-hold feature is not required. It is removed by turning the MARK HOLD LEVEL control to the extreme counterclockwise position until the mark-hold switch is heard to operate. When the mark-hold feature is used, the following adjustments are made:

a. Turn the MARK HOLD LEVEL knob fully clockwise.

b. With the power at the distant transmitter off or with both receivers detuned from the signal, verify that a steady marking signal is connected to the receiving d-c loops (the teletype-writer does not run open). Do not turn the receiver volume down for this test because total noise should be present.

Note. Occasional kicks may be transmitted if a relatively high noise level prevails. In this case, slowly turn the MARK HOLD LEVEL knob counterclockwise until a steady marking signal is produced.

c. When the transmitted signal is again received, verify that the setting in b above is not such as to cause steady marking signals which interrupt normal keying.

d. Check the setting of the MARK HOLD LEVEL knob from time to time, since it is important to provide a setting which is as far clockwise as possible. This setting should be such that the mark-hold circuit will not interfere when weak or fading r-f signals are received, yet far enough counterclockwise to provide application of a steady marking signal when the received signal is discontinued. The setting of the control is subject to some change due to variable noise levels and different volume control adjustments of the associated receivers.

57. Procedures While Circuit is in Use

a. Perform tuning checks as follows:

(1) During period while steady mark is

transmitted.

- (a) Observe meters A and B on the dual diversity converter (METER B in CHAN B position).
- (b) Due to diversity action during fading conditions, the meter readings will change. First one meter then the other will read 50. If one of the meters never attains a reading of 50, make sure the tuning is correct by turning the VOL control completely counterclockwise on the receiver which gives the larger meter indication and by readjusting the VERNIER control of the other receiver.
- (2) During period when miscellaneous TT signals are transmitted.
- (a) When receiving miscellaneous TT signals, the deflections on both meters A and B should average around zero. (METER B in CHAN B position.)
- (b) Detuning will be evident if either meter averages either to the left or to the right for an extended period of time.
- (c) Retune, if necessary, with the VERNIER control of the detuned receiver.

Note. Do not use the drift compensator (DRIFT COMPENSATOR switch down) if the above adjustments are not required more than once an hour after allowing about a 2-hour warm-up period for the equipment. Use the drift compensator if adjustments are frequently necessary even after a 2-hour warm-up period. Do not use the drift compensator feature for weak signal reception.

b. Continually monitor the input level on meter B of the converter (METER B switch on INPUT).

- (1) The level should be above 15 even on extreme fades, preferably full scale at all times. If peaks of 100 cannot be obtained, turn the receiver volume to maximum.
- (2) Keep the ALIGN INPUT control on the Channel A and Channel B receivers at the position which gives the maximum input on meter B (METER B switch at INPUT).
- c. Operate both receivers simultaneously for

dual diversity reception.

d. Keep the C.W.-OSC. switch on the Channel A and Channel B receivers at OFF, except when using the loudspeaker or phones to listen for a distant station. The C.W.-OSC. switch in the ON position may at times cause errors

in the received copy.

e. Keep the CRYSTAL PHASING control on the receivers set at OUT at all times.

f. Keep the OFF-M.V.C.-A.V.C. switch on the receivers at M.V.C. at all times.

Section V. OPERATION UNDER USUAL CONDITIONS

Component	Control	Position
Shelter S-55/GRC	Power circuit breaker	OFF.
Radio Receivers R-336/GRC-26	Light circuit breaker	OFF.
	OFF-M.V.C.-A.V.C. switch	OFF.
	REC. SEND switch	REC.
	BAND CHANGE switch	Set to correct band.
	C.W.-OSC. switch	OFF.
	FAST TUNING control	Set to approximate frequency on FREQUENCY dial.
Dual Diversity Converter CV-31B/TRA-7	CRYSTAL PHASING-OUT knob	OUT.
	AC SUPPLY switch	Off (down).
	PLATE power switch	Off (down).
	OUTPUT switch	NORMAL.
	METER B	INPUT.
	DRIFT COMPENSATOR	Out (down).
	BAND WIDTH switch	NARROW.
	AC SUPPLY switch	Off (down).
	TRANSMITTER switch	Off (down).
	ON-OFF motor switch	OFF.
	POWER switch	OFF (up).
	MOTOR ON-MOTOR OFF switch	MOTOR OFF.
	STOP-SEND switch	STOP.
	ON-OFF switch	OFF.
	NORMAL-EXTENSION switch	NORMAL.
Control Unit C-292(*)/TRA-7	AC SUPPLY switch	Off (down).
Teletypewriter TT-55(*)/MGC	OVEN switch	Off (down).
Perforator-Transmitter TT-56/MGC	TEST OSC 850—switch	OFF.
	TEST key	NORM.
Rectifier RA-87	Operation switch	OFF.
Radio teletypewriter C-535/GRC-26	Power switch (on power cord)	OFF.
Frequency Shift Exciter O-39B/TRA-7	FILAMENT POWER switch	Off (down).
	FILAMENT VOLTAGE control	Full counterclockwise position.
	EXCITER PLATE POWER switch	NORMAL (down).
	HIGH VOLTAGE PROTECT switch	NORMAL (down).
	PLATE POWER switch	Off (down).
	C.W.-PHONE switch	C.W.
	EXCITATION METER SWITCH	INT. AMP. GRID.
Frequency Meter BC-221-(*)	BAND SWITCH	To correspond with band to be used with tuning unit.
Radio Transmitter T-213/GRC-26		

58. Preliminary Starting Procedures

Before starting Power Unit PE-95-G, check that the controls of the components in the shelter are in the positions noted above. Starting procedure is in section IV of this chapter.

59. Types of Operation

a. MOBILE. The term *mobile* describes operation in which the vehicle on which the set is

mounted is actually in motion. Radio Set AN/GRC-26 is designed for mobile operation only with one-way reversible service. It is often advantageous to use two frequencies for mobile one-way reversible service, one for receiving and one for transmitting. This permits changing to full- or half-duplex service as quickly as possible when the vehicle halts.

Caution: Under mobile conditions, never have the transmitter and receiver on at the

same time even if the transmitting and receiving frequencies are not the same. Always use one-way reversible service.

b. MOBILE AT HALT. The term *mobile at halt* describes operation in which the vehicle on which the set is mounted is at halt, but may be made mobile with a minimum of preparation. Frequently mobility can be resumed with no other preparation than starting the vehicle engine. The transmitting and receiving whip antennas may be used for mobile-at-halt operation, but it is recommended that an emergency doublet be erected whenever time and the tactical situation permit. Full-duplex, half-duplex, or one-way reversible service may be used for mobile-at-halt operation. Be careful when choosing the frequencies for full- and half-duplex service, especially when a temporary transmitting doublet is not used. Satisfactory operation is usually obtained with the two frequencies being 400 kc or more apart, provided that the transmitter frequency is not too close to a subharmonic of the receiving frequency or the receiver image frequency. Single-channel reception is always used for both mobile and mobile-at-halt operation.

c. SEMIFIXED. The term *semifixed* describes operation in which receiving and transmitting doublets are erected. The shelter may or may not be mounted on a vehicle. Full-duplex, half-duplex, or one-way reversible service may be used. Dual diversity reception is normally used except for low operating frequencies; insufficient material is supplied to construct the two receiving doublets for low operating frequencies.

60. Types of Service

a. FULL-DUPLEX. In any radio circuit in which independent transmission paths (two separate frequencies) are provided, it is possible for two radio stations to interchange (transmit and receive) radioteletype messages simultaneously. The system of operation is termed *full-duplex* operation. One TT (teletypewriter) is used for sending and a second TT is used for receiving at each location.

- (1) With the distant terminal transmitting, tune the two receivers to the frequency of the distant radio transmitter.
- (2) Communicate with the distant radio

terminal and check that satisfactory two-way transmission is obtained.

b. HALF-DUPLEX. The term *half-duplex* describes to-and-fro (one direction at a time) radioteletype service that uses two r-f assignments with the break-in feature. With this feature, either the local or distant operator can interrupt the other operator's transmission by pressing the TT BREAK key, which results in a break signal being received at the other station. With this method of operation, the same teletypewriter is used for sending and receiving at each location.

- (1) Communicate with the distant radio terminal and arrange to go on half-duplex operation. Turn the SERVICE knob on Control Unit C-292(*)/TRA-7 to the HALF DX position at the arranged time and check that satisfactory two-way operation is obtained.
- (2) Operate the BREAK key on the send teletypewriter, and check that the break signal is received at the distant station.
- (3) Have the distant terminal operate the BREAK key on their send teletypewriter and check that a break signal is received locally.

c. ONE-WAY REVERSIBLE. In radioteletype operation, the term *one-way reversible* describes to-and-fro (one direction at a time) service in which the transmitter and receiver of each set are never operating simultaneously. The switch which puts the transmitter into operation disables the receivers. When the receivers are operating, the transmitter is disabled. One-way reversible service will always be used for mobile operation. It will always be used when only one frequency is available. When one-way reversible operation is used, set the TRANSMITTER switch on Control Unit C-292(*)/TRA-7 to the ON position when transmitting and off (down) after a transmission is completed until given a GA (go ahead) signal by the distant transmitter.

- (1) Communicate with the distant radio terminal and have the operator turn the SERVICE knob on the control unit to the ONE WAY position at a stated time.
- (2) Have the operator of the distant terminal adjust the MARK HOLD LEVEL knob on the dual diversity

converter in accordance with procedures outlined in paragraph 56. The mark-hold function is provided to maintain, automatically, a steady marking signal for holding the teletypewriter in the absence of a sufficiently strong r-f signal.

- (3) Have the operator of the distant terminal set the REC.-SEND switches of Radio Receivers R-336/GRC-26 to the SEND position. This allows the receiver disabling circuits to operate.
- (4) Turn the SERVICE knob on the local control unit to the ONE WAY position.
- (5) Adjust the MARK HOLD LEVEL knob of the dual diversity converter in accordance with the procedures outlined in paragraph 56.
- (6) Set the REC.-SEND switches of the local receivers to the SEND position.
- (7) At the stated time, check the transmission in each direction.

Caution: With one-way operation, always operate the TRANSMITTER switch on the control unit to the *off* (down) position as soon as sending is stopped.

61. Single Channel and Diversity Reception

a. SINGLE CHANNEL. The term *single channel* describes reception in which only one receiver (with its associated antenna) is operating at a time. In Radio Set AN/GRC-26, Channel A (lower) receiver and antenna generally are used for single channel reception. The VOL control on Channel B (upper) receiver is usually turned to the extreme counterclockwise position. However, if RF Cable Assembly CG-562/U is disconnected from the Channel B receiver, this receiver may be tuned to a different station for monitoring. Single channel reception is always used for mobile and mobile-at-halt operation where the whip antenna is used for reception.

b. DUAL DIVERSITY. Dual space diversity reception is used to minimize the effects of selective fading at the individual antennas associated with each radio receiver. To minimize such effects, the receiver doublet antennas are spaced approximately 1,000 feet apart and

the output of each receiver, both of which are tuned to the same frequency, is combined in Dual Diversity Converter CV-31(*)/TRA-7 through a common limiter and amplifier circuit so that when the signal fades in one receiver circuit, the other takes over and vice versa. The drift compensator should not be used when establishing a dual diversity circuit. This feature can be inserted later if required. The following procedure may be used to start dual diversity operation.

- (1) Establish a working receiving circuit while receiving an RY test tape or miscellaneous TT signals. First tune Channel A receiver with Channel B receiver volume at a minimum; then tune Channel B receiver with Channel A receiver volume at a minimum.
- (2) Be sure that the discriminator output shown on meter A and then on meter B (with METER B switch in CHAN B position) centers around the zero point.
- (3) Observe which receiver shows a lower input into the converter (METER B switch on INPUT). The reading should be over 50 even when the signal fades; however, a lower reading may still permit operation.
- (4) Return the weaker receiver to the circuit and set its VOL control at maximum.
- (5) Slowly bring the stronger receiver into the circuit until meters A and B (METER B switch on CHAN B) oscillate in unison.
- (6) Maintain the volume of both receivers as near maximum as possible.
- (7) On steady mark signals, meters A and B (switched to CHAN B) should show the diversity effect of the two antennas if there is considerable fading. First one meter should read a full mark deflection (50 for an 850-cycle shift) and the other zero; and later, the second meter should read a full mark deflection while the first meter reading is zero. If both signals are of equal strength, the readings should divide equally; that is, 25 on each meter. If the strengths are unequal, they will divide proportionately.

ly. In either case, however, the readings should always add up to the full mark deflection of either receiver alone.

- (8) Check that each meter reading averages near zero over long periods of time when receiving miscellaneous signals.
- (9) Be extremely careful when adjusting the VERNIER control of the Channel A receiver, since the circuit will fail if the receiver frequency is changed too much or too rapidly.

62. Additional Normal Operating Facilities

a. OPERATING WITH REMOTE TELETYPEWRITER EQUIPMENT. The SEND and RECEIVE EXTENSION terminals of the TT control can be connected into any neutral TT land line. Among other things, this permits remote TT equipment to be operated with, or instead of, equipment in the shelter. To use remote TT equipment, make the following connections to Radioteletypewriter Control C-535/GRC-26:

- (1) Connect receiving plug of remote equipment to RECEIVE EXTENSION terminals by suitable wire. Wire WD-1/TT is supplied, but Wire W-110-B may be used.
- (2) Connect send (black) plug of external equipment to SEND EXTENSION terminals by a suitable wire. Long lines introduce distortion in teletypewriter signals. If a long line is used, insert Line Unit BE-77-(*) in the circuit to reduce distortion. For operation of the line unit, refer to TM 11-359.
- (3) Operate NORMAL-EXTENSION switch of the teletypewriter control to EXTENSION position.

b. RELAY OPERATION. When radio transmitting and receiving stations are too far apart for the equipment or frequency being used, install one or more relay stations between the transmitting and receiving stations to insure good communications. Radio Set AN/GRC-26 may be operated as a relay station. When operated as a relay station, the received and transmitted frequencies should be different, to prevent interference between local transmitter and receiver. To operate the set as a relay sta-

tion, tune the equipment to the proper receiving and transmitting frequency.

- (1) Set OPERATION knob of control unit to EMERG FS.
- (2) Set SERVICE knob to FULL DX.
- (3) Remove red plug of receiving teletypewriter from RED jack in TT control and insert it in NEUTRAL TTY FROM CV-31A/TRA-7 jack. Receiving TT will now monitor relayed signal.

c. SIMULTANEOUS RADIOTELEPHONE AND RADIOTELETYPE OPERATION. Radio Set AN/GRC-26 is designed to permit simultaneous radiotelephone and radioteletype communication under strong signal conditions. For satisfactory service, the receivers and converter must be tuned very carefully.

d. VOICE OPERATION. Voice operation of Radio Set AN/GRC-26 does not require the operation of Converter CV-31(*)/TRA-7, Control Unit C-292(*)/TRA-7, Radioteletypewriter Control C-535/GRC-26, the teletypewriters, and Rectifier RA-87. Frequency Shift Exciter O-39(*)/TRA-7 may or may not be used to provide r-f excitation for the transmitter under voice operation. For normal voice operation, it is recommended that Frequency Shift Exciter O-39(*)/TRA-7 be used for exciting the transmitter. In the event the exciter is inoperative, the transmitter drive may be supplied by the r-f tuning boxes which are supplied as part of the transmitter. Either Microphone T-17 (carbon) or Microphone T-50 (dynamic) may be used to modulate the transmitter for voice operation. If Microphone T-17 is used, connect it to CARBON MIC. 1 jack of Speech Amplifier BC-614-(*). Connect Microphone T-50, if used, to DYNAMIC MIC: 2 socket of speech amplifier.

- (1) After the transmitter has been tuned to the desired frequency (as explained in TB SIG 220), set the PLATE POWER switch to off (down).
- (2) Set the C.W.-PHONE switch at PHONE position.
- (3) Set the MODULATOR BIAS control on front panel of transmitter to extreme counterclockwise position (this is for increasing the bias).
- (4) Set the PLATE POWER switch to on (up). This will operate plate relay RY-1 and antenna shorting relay

- RY-4. This is accomplished during operation by Speech Amplifier BC-614-(*) which shorts pins 3 and 4 in socket SO-5 of the transmitter.
- (5) The P.A. PLATE meter should read approximately 250 ma, which is normal plate current for voice operation. This is approximately 40 ma less than a normal reading for c-w operation as the C.W.-PHONE switch automatically reduces the power amplifier plate voltage when the switch is operated to PHONE position.
- (6) Modulator current, flowing through pins 5 and 8 of Cord CD-764, is shown by the meter in Speech Amplifier BC-614-H. Cord CD-764 is connected between transmitter socket SO-5 and speech amplifier Socket SO-103. The audio signal is obtained through pins 6 and 7 of the same cord and should cause the modulator current to reach approximately 200 ma at voice peaks.
- (7) Hold the microphone in the left hand, press the press-to-talk switch, and with the right hand adjust the MODULATOR BIAS control of the transmitter until the MODULATOR PLATE meter on Speech Amplifier BC-614-H indicates approximately 40 ma. Release the press-to-talk switch. Radio Set AN/GRC-26 is ready for voice operation.

Caution: NEVER change the position of the transmitter C.W.-PHONE switch while the PLATE POWER switch is in the on (up) position.

63. Emergency Operation

Note. In emergency c-w transmission, it is desirable to turn the PLATE POWER switch of Radio Transmitter T-213/GRC-26 to the *on* position. This prevents keying the plate power relay (RL-1) of the transmitter.

a. EMERGENCY C-W TRANSMISSION.

- (1) Insert the plug from telegraph Key J-45 into the C.W. KEYING jack of

- the teletypewriter control.
- (2) Operate the TEST key on the exciter to the MARK position.
- (3) Manipulate the telegraph key and observe that—
- (a) The BUFFER INDICATOR lamp lights when the telegraph key is depressed, and goes out when the key is released.
- (b) Normal current meter readings are indicated on the radio transmitter while the key is depressed.
- b. EMERGENCY FREQUENCY-SHIFT TRANSMISSION.
- (1) Turn the OPERATION knob on the control unit to EMERG FS and the METER knob to SEND LINE CURRENT.
 - (2) Turn the OUTPUT knob on the dual diversity converter to SPACE and insert the plug from the telegraph key into the F.S. KEYING jack of Radioteletypewriter Control C-535/GRC-26. Hold the telegraph key depressed to transmit a mark signal.
 - (3) Check to see that meter B on the converter indicates 60 to the right (METER B switch in NEUTRAL position).
 - (4) Release the telegraph key to transmit a space signal.
 - (5) Check that meter B indicates zero.

- c. EMERGENCY C-W, ALTERNATE METHOD. If none of the radioteletype equipment is operating, it is possible to key the transmitter by means of Speech Amplifier BC-614-(*) alone. The transmitter must be tuned by the master oscillator as explained in TB SIG 220.

64. Checklist of Switch Positions

If the equipment does not operate in the desired manner, check that the transmitter, receiver, and exciter are tuned properly. Then check that the switches on all components are in the positions indicated below for the service and operation desired.

Component	Switch	Position for—				
		Teletypewriter			Emergency cw	Emergency frequency shift
		Full duplex	Half duplex	One way		
Radio Transmitter T-213/GRC-26.	FILAMENT POWER...	ON (up)....	ON (up)....	ON (up)....	ON (up)....	ON (up).
	EXCITER PLATE POWER.	ON (up)....	ON (up)....	ON (up)....	ON (up)....	ON (up).
	PLATE POWER.....	OFF (down)	OFF (down)	OFF (down)...	ON (up)....	OFF (down).
	PHONE-C.W.....	C.W.....	C.W.....	C.W.....	C.W.....	C.W.
	BAND SWITCH.....	(¹)	(¹)	(¹)	(¹)	(¹)
	HIGH VOLTAGE PROTECT.	NORMAL..	NORMAL ² .	NORMAL ² ...	NORMAL ² .	NORMAL.
	TRANSMITTER.....	ON.....	ON.....	ON to send; Off (down) to receive.	ON.....	ON.
	SERVICE.....	FULL DX..	HALF DX.	ONE WAY...	HALF DX or FULL DX.	HALF DX or FULL DX.
Control Unit C-292(*)/TRA-7.	OPERATION.....	NORMAL..	NORMAL..	NORMAL....	EMERG CW.	EMERG FS.
	AC SUPPLY.....	ON.....	ON.....	ON.....	ON.....	ON.
	TEST.....	NORM....	NORM....	NORM....	MARK....	NORM.
	OVEN.....	ON.....	ON.....	ON.....	ON.....	ON.
	AC SUPPLY.....	ON.....	ON.....	ON.....	ON.....	ON.
	AC SUPPLY.....	ON.....	ON.....	ON.....	ON.....	ON.
	PLATE.....	ON.....	ON.....	ON.....	ON.....	ON.
	OUTPUT.....	(³)	(³)	(³)	Any.....	SPACE.
Frequency Shift Exciter 0-39- (*)/TRA-7. Dual Diversity Converter CV- 31(*)/TRA-7.	OFF-M.V.C.-A.V.C.	M.V.C....	M.V.C....	M.V.C....	M.V.C....	M.V.C.
	C.W.-OSC.....	OFF.....	OFF.....	OFF.....	ON.....	ON.
	REC-SEND.....	SEND.....	SEND.....	SEND.....	SEND.....	SEND.

¹Set to select tuning unit being used.

²Except while tuning up.

³NORMAL or REVERSE, depending on frequency.

65. Teletypewriter Operation

a. GENERAL. The send TT equipment keys the control unit which in turn keys the exciter and thus the transmitter. Receiving TT equipment is keyed by the control unit. The control unit is keyed by TT signals obtained in the converter from the radio signals received by the receivers.

b. DESCRIPTION OF EQUIPMENT.

(1) The teletypewriters and the perforator have a black plug brought out from the transmitting contacts and a red plug brought out from an independent receiving mechanism. There is no internal connection between the transmitting and receiving portion of the equipment.

(2) The transmitter-distributor has a set of transmitting contacts terminated in a gray plug.

(3) The setting of Radioteletypewriter Control C-535/GRC-26 determines which teletypewriter is to receive and which is to send. It also can connect the perforator into one of the teletypewriter circuits.

c. STARTING PROCEDURE. Set the switches of the components of the teletypewriter equipment as follows:

Component	Switch	Position
Rectifier RA-87....	ON-OFF.....	ON.
Perforator- transmitter.	MOTOR.....	On (down).
Transmitter- distributor.	MOTOR ON- MOTOR OFF.	MOTOR ON.
Teletypewriters....	ON-OFF.....	ON.

d. TRANSMITTING WITH PREPARED TAPE.

(1) Insert message tape in the transmit-

ter-distributor and set the STOP-SEND switch to the SEND position.

- (2) To stop sending, set the STOP-SEND switch to STOP.
- (3) Local page copy will be obtained on the sending teletypewriter as selected by the setting of the teletypewriter control switch.

e. PREPARING TAPE.

- (1) On Radioteletypewriter Control C-535/GRC-26, set REPERFORATOR CONNECTED TO switch to PUNCH TAPE.
- (2) Use the perforator keyboard and make tape, observing the light on the right side of the machine to prevent overtyping beyond the paper on page copy when the tape is received at the remote end.

f. TRANSMITTING MANUALLY.

- (1) Set either RIGHT TT-55/MGC or LEFT TT-55/MGC switch to SEND on Radioteletypewriter Control C-535/GRC-26.
- (2) On the chosen teletypewriter set to SEND in (1) above, set the SEND-REC-BREAK key at SEND.
- (3) Type out the message on the keyboard.
- (4) To prepare tape and page copy locally and to transmit simultaneously, connect the perforator to the sending TT by REPERFORATOR CONNECTED TO switch of Radioteletypewriter Control C-535/GRC-26.

writer Control C-535/GRC-26. Type out the message on the keyboard of either the sending TT or the perforator.

g. RECEIVING.

- (1) Set either RIGHT TT-55/MGC or LEFT TT-55/MGC switch to RECEIVE on Radioteletypewriter Control C-535/GRC-26.
- (2) On the teletypewriter switched to RECEIVE in (1) above, set SEND-REC-BREAK key at REC. Page copy will be received.
- (3) To obtain tape copy, connect perforator to the TT that is receiving by means of REPERFORATOR CONNECTED TO switch of Radioteletypewriter Control C-535/GRC-26. Both tape and page copy will be made locally.

h. OPERATION OF PERFORATOR-TRANSMITTER.
The perforator connection box d-c power cord provides current for two local circuits, one having three jacks in series, the other having two (fig. 45). These jacks in conjunction with the line 1 and line 2 jacks permit various operating combinations as follows:

- (1) To send from perforator keyboard to line and receive from line (making page copy on both operations). To prepare a tape locally and to transmit simultaneously to another line from the tape (the station functioning

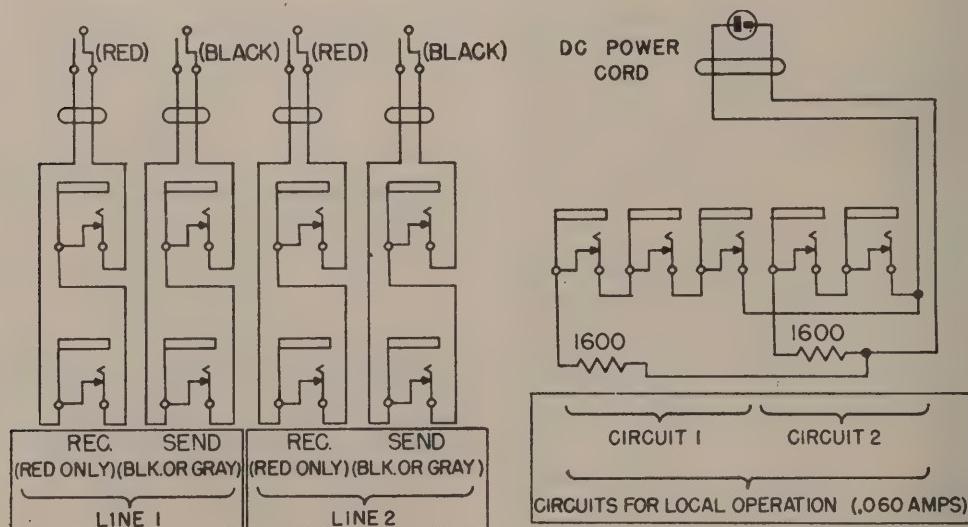


Figure 45. Perforator connection box patching circuits.

as a repeater) :

- (a) Remove gray plug of the TD (transmitter-distributor) from the TT control and insert it in either test circuit of the perforator connection box.
- (b) Feed tape into TD..
- (c) Remaining jacks of test circuit will give TD output. This can be picked up by red plug of receiving teletypewriter.
- (d) Connect perforator to send teletypewriter by REPERFORATOR CONNECTED TO switch.
- (2) To send from perforator keyboard to line and to receive from line (making tape copy in both operations) and to prepare simultaneously page copy from perforated tape previously obtained from any source:
 - (a) Remove gray plug from TT control and insert it into a test circuit 1 jack.
 - (b) Insert red plug of teletypewriter which is to make page copy from tape into a free circuit 1 jack.
 - (c) Feed desired tape into TD.
 - (d) Switch TD SEND-STOP switch to SEND.
 - (e) Connect other teletypewriter to line by RIGHT TT-55/MGC or LEFT TT-55/MGC switches of TT control.
 - (f) Connect perforator to this teletypewriter by the REPERFORATOR CONNECTED TO switch.
- (3) To prepare a perforated tape and page copy from previously prepared tape:
 - (a) Switch RIGHT or LEFT teletypewriter to send by setting proper RECEIVE-OFF-SEND switch to SEND.
 - (b) Connect perforator to send teletypewriter by REPERFORATOR CONNECTED TO switch.
 - (c) Operate TRANSMITTER switch of control unit to off (down).
 - (d) Insert tape in TD.
 - (e) Start TD.

od of time, the components need not be turned off individually. Remove power by—

- (1) Operating transmitter PLATE POWER switch to off (down).
- (2) Operating control unit TRANSMITTER switch to off (down).
- (3) Operating exciter TEST key to NORM.
- (4) Operating shelter circuit breakers to OFF.
- (5) Pressing power unit STOP button firmly until engine stops.

b. The set can then be started simply by switching power unit (with power unit CIRCUIT BREAKER in OFF position) operating circuit breakers of power unit and shelter to ON position, and, after a suitable time delay, applying transmitter plate power.

c. To turn off all the individual components, operate equipment switches and controls in the following order:

Equipment	Control	Position
Radio Transmitter T-213/GRC-26.	PLATE POWER switch. FILAMENT VOLTAGE control. FILAMENT POWER switch.	Throw to OFF position. Turn fully counterclockwise. Set at OFF (down).
Frequency Meter BC-221-(*)�.	Power switch (on power cord).	Set at OFF.
Frequency Shift Exciter O-39(*)� TRA-7.	TEST key AC SUPPLY switch. OVEN switch.....	Set at NORM. Set at OFF (down). Set at OFF (down).
Rectifier RA-87.....	ON-OFF switch...	Set at OFF.
Perforator-Transmitter TT-56/MGC.	Perforator POWER switch. Transmitter-distributor motor switch. STOP-SEND switch.	Set at OFF. Set at OFF. Set at STOP.
Teletypewriters TT-55/MGC.	ON-OFF motor switch.	Set at OFF.
Control Unit C-292(*)/TRA-7.	TRANSMITTER switch. AC SUPPLY switch.	Set at OFF (down). Set at OFF (down).
Dual Diversity Converter CV-31(*)/TRA-7.	PLATE POWER switch. AC SUPPLY switch.	Set at OFF (down). Set at OFF (down).
Radio Receivers R-336/GRC-26.	OFF-M.V.C.-A.V.C. switch.	Set at OFF.

66. Stopping Procedure

- a. To turn the entire set off for a short peri-

Equipment	Control	Position
Shelter S-55/GRC..	REC.-SEND switch.	Set at SEND.
Power Unit	Circuit breakers....	Set at OFF.
PE-95-G.	STOP button.....	Press firmly until engine stops.

d. An alternative method is to turn the EXCITER PLATE POWER switch of the transmitter to the *off* position and the TRANSMITTER switch of the control unit to the *off* position and then throw the switch of the power unit to OFF. Then push the STOP button until the engine stops.

Section VI. OPERATION UNDER UNUSUAL CONDITIONS

67. General

The operation of Radio Set AN/GRC-26 may be difficult in regions where extreme cold, heat, humidity and moisture, sand conditions, etc., prevail. In the following paragraphs, instructions are given on procedures for minimizing the effect of these unusual operating conditions.

68. Operation in Arctic Climates

Subzero temperatures and climatic conditions associated with cold weather affect the efficient operation of the equipment. Instructions and precautions for operation under such adverse conditions follow:

- a. Handle the equipment carefully.
- b. Keep the equipment warm and dry. Keep shelter heater turned on at all times and regulate ventilation as necessary. Gasoline Heater OG-31 (fig. 46) may be requisitioned for auxiliary heating if the shelter heater is not adequate. Gasoline Heater OG-31 is operated external to the shelter, and the heat is fed through an inlet in the lower rear door.
- c. Take precautions to prevent cold air from coming into contact with heated tubes when the shelter door is opened. A sudden draft of cold air is often sufficient to shatter the glass envelope of a heated tube.

d. Do not attempt to operate teletypewriters when they are cold because the typing mechanism is inoperable at low temperatures. Allow adequate warm-up time before using them.

e. Heavy coatings of frost will gather on mouth-type microphones in extreme cold weather when the microphones are used in the open air or in a cold room. Breath will cause frost to form in the small holes of the cap, and will affect transmitter modulation. Rubber and fabric diaphragms have been designed to protect some types of microphones; use them when

available. Have a spare microphone ready, if possible, in case the one in use fails to function properly.

f. The equipment will sweat until it is brought up to operating temperature after exposure to the cold. This condition also arises when equipment is used after exposure during a cold night.

g. Use any improvised means to protect dry batteries, since they will fail if not protected against the cold. Preheat the batteries. To prevent heat loss, place them in bags lined with kapok, spun glass fiber materials, animal skins, or woolen clothing.

69. Operation in Tropical Climates

a. When operating equipment in tropical climates, high relative humidity will cause condensation of moisture on the equipment whenever the temperature of the equipment becomes lower than the ambient air. To minimize this condition, place lighted electric bulbs under the equipment. Dry the equipment thoroughly before operating it.

b. Tape all cable connectors with rubber tape to prevent shorts and leakage caused by moisture.

70. Operation in Desert Climates

a. Conditions similar to those encountered in tropical climates often prevail in desert areas. Use the same measures to insure proper operation of the equipment.

b. The main problem which arises with equipment operation in desert areas is the large amount of sand or dust and dirt which enters the moving parts of radio equipment, such as motors and power units. The ideal preventive precaution is to house the equipment in a dustproof shelter. Since, however, such a

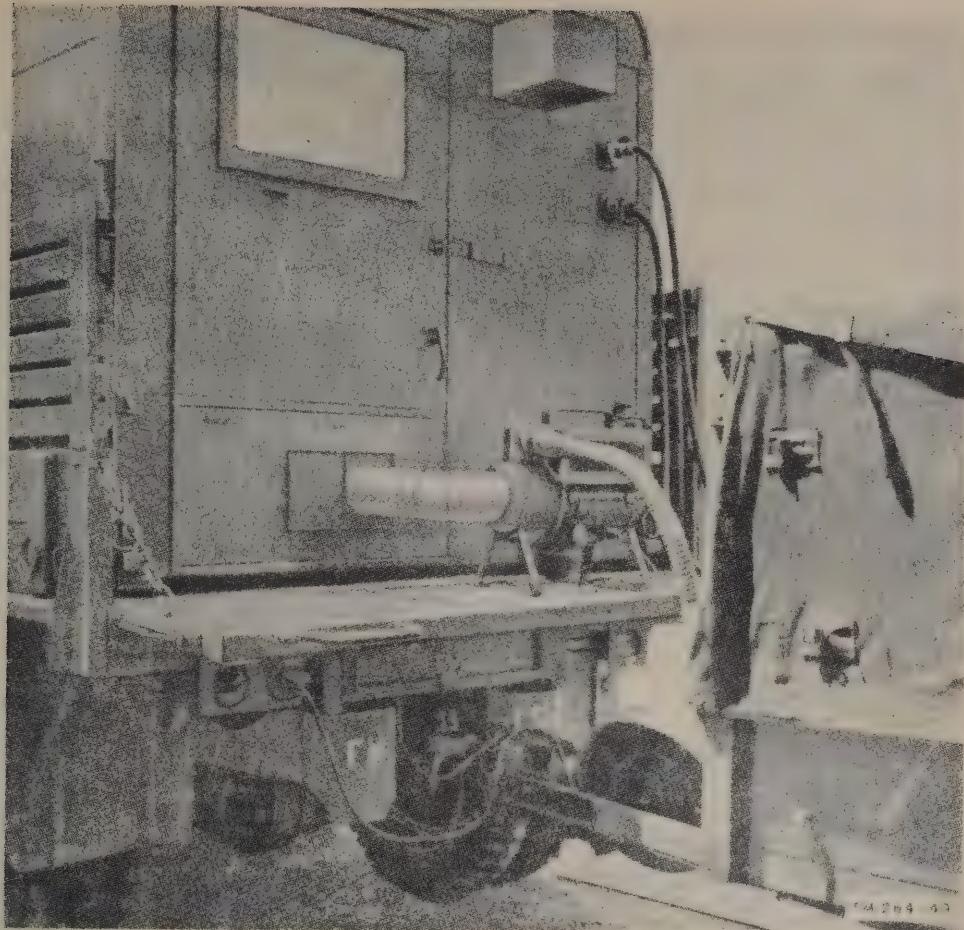


Figure 46. Gasoline Heater OG-31 in use.

building is seldom available and would require air conditioning, the next best precaution is to make the shelter in which the equipment is located as dustproof as possible with available materials. Hang wet sacking over windows, skylight, and door.

c. Take care to keep the equipment as free from dust as possible. Make frequent preventive maintenance checks (pars. 73 through

75). Pay particular attention to the condition of the lubrication of the equipment. Excessive amounts of dust, sand, or dirt that come into contact with oil and grease result in grit, which will damage the equipment.

d. Make periodic checks of doublet antennas to prevent damage during sudden wind squalls which occur in desert areas.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. ORGANIZATIONAL TOOLS AND EQUIPMENT

71. Tools and Tool Sets Supplied with Radio Set AN/GRC-26

Tools and materials supplied with the radio set are listed in *a* and *b* below. The tools and materials contained in Tool Equipment TE-50-(*) and Tool Equipment TE-113-(*) are listed in Department of the Army Supply Catalogs SIG 6-TE-50 and SIG 6-TE-113.

a. TOOLS.

Tool Equipment TE-50-(*), including teletypewriter tools and Multimeter TS-297/U. See packing list for complete list of tools.

Tool Equipment TE-113-(*). See packing list for complete list of tools.

Wrench, set screw, short-arm series, 5/64" across flats, to fit Allen #8 set screw and Allen #4 socket-head cap screw, for control unit and converter (2 ea).

Wrench, set screw, long-arm series, 5/64" across flats, to fit Allen #8 set screw, #4 socket-head cap screw, and #6 flat-head cap screw, for exciter.

Wrench, set screw, L shape, 0.05" across flats, to fit Allen #4 set screw, for converter.

Wrench, set screw, short-arm series, 1/16" across flats, to fit Allen #5 and #6 set screws, for exciter.

Gage TL-560/U, spring tension (2 ea).
Gage, thickness, 0.008" thk (SigC stock No. 6R40932A) (2 ea).

Gage, thickness, 0.010" thk (SigC stock No. 6R40932B) (2 ea).

Gage, thickness, 0.013" thk (SigC stock No. 6R40932C) (2 ea).

Gage, thickness, 0.015" thk (SigC stock No. 6R40932D) (2 ea).

Gage, thickness, 0.017" thk (SigC stock No. 6R40932E) (2 ea).

Gage, thickness, 0.047" thk (SigC stock No. 6R40932R) (2 ea).

Burnisher TL-557/U, with blades and

wire (2 ea).

Wrench, double-end box, 3/16"-1/4" hex openings (SigC stock No. 6R41274A) (2 ea).

Adjuster, spring (WECo #505A) (SigC stock No. 6R41305A) (2 ea).

Adjuster, spring (WECo #507A) (SigC stock No. 6R41307A) (2 ea).

Tube Puller TL-201.

Wrench, socket, hex, 45" lg, 0.812" across flats, T-handle (for transmitter bolts).

b. MATERIALS.

Cheesecloth, bleached, lint-free.

Oil, lubricating, 3-ounce can.

Solder M-31.

Tape TL-83, friction.

Tape TL-192, rubber.

72. Special Tools for Radio Set AN/GRC-26

The tools that are furnished with Radio Set AN/GRC-26 should be adequate for organizational maintenance of the equipment. Additional tools, if required, may often be improvised. For example, a safety shorting stick and several shorting jumper wires may be constructed as follows:

a. To construct a safety shorting stick (fig. 47), secure a dry piece of wood or some other material which is a good electrical insulator. It should be about 36 inches long and about 1 inch square. The latter dimension is not very important. Securely fasten a piece of copper or brass rod (or thin tubing) to one end of the stick in such a manner that the rod extends 12 inches beyond the end of the stick. The free end of the rod should be bent in the form of a small hook. Solder a piece of heavy flexible hook-up wire about 18 inches long to the metal rod at the point where it is fastened to the stick. Attach a heavy clip to the free end of the wire.

b. The jumper wires are made from heavy flexible wire, about 18 inches long, with heavy

clips attached to each end. These are intended for use as shorting links across h-v (high-

voltage) capacitors in components that are being repaired or cleaned.

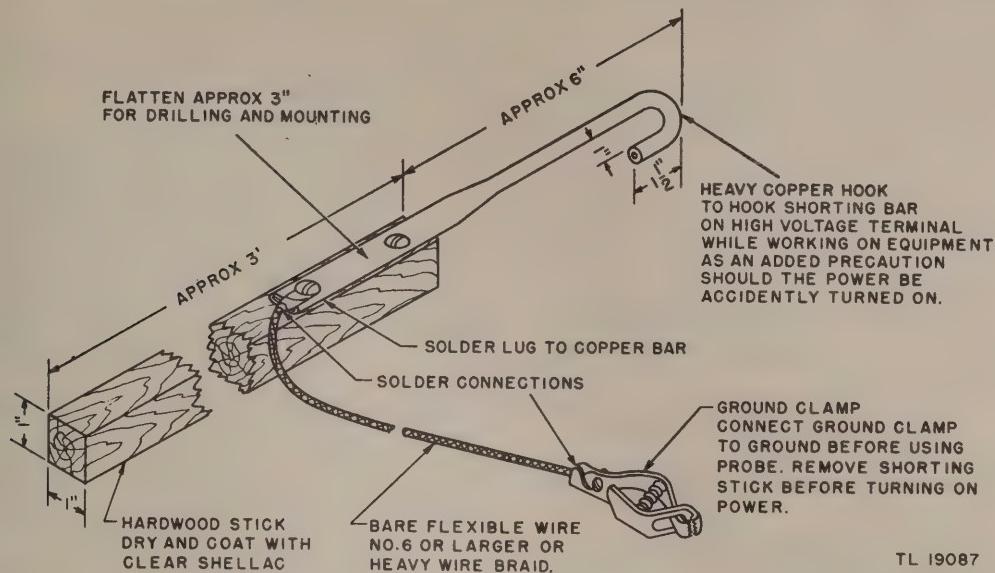


Figure 47. Construction of shorting stick.

Section II. PREVENTIVE MAINTENANCE SERVICES

73. Definition of Preventive Maintenance

Preventive maintenance is work performed on equipment (usually when the equipment is not in use) to keep it in good working order so that breakdowns and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble shooting and repair since its object is to prevent certain troubles before they can occur. See TM 38-650.

74. General Preventive Maintenance Techniques

a. Use materials provided for cleaning the shelter and components. Floor broom, bench brush, and cheesecloth are available.

b. Use No. 0000 sandpaper to remove corrosion from cable connectors, switches, relays, and terminals of electrical components.

c. Use No. 0000 sandpaper to remove corrosion from the antenna mast. After cleaning, touch up all areas not used for electrical contact, using olive drab paint.

d. Use a clean, dry, lint-free cloth or a dry brush for cleaning.

(1) If necessary, except for electrical contacts, moisten the cloth or brush

with Solvent, dry-cleaning (SD); then wipe the parts dry with a cloth.

(2) Clean electrical contacts with a cloth moistened with carbon tetrachloride; then wipe them dry with a dry cloth.

e. If available, dry compressed air may be used at line pressure *not exceeding 60 psi* (pounds per square inch) to remove dust from inaccessible places; *be careful*, however, or mechanical damage from the air blast *may result*.

f. For further information on preventive maintenance techniques, refer to TB SIG 178.

75. Performing Preventive Maintenance

The following preventive maintenance operations should be performed by organizational personnel at the intervals indicated, unless these intervals are reduced by the local commander:

Caution: Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

a. DAILY.

Caution: Before checking equipment be sure that all equipment is disconnected, and upon

completion, reconnect power and check for satisfactory operation.

- (1) Clean exterior of cabinets and equipment.
- (2) Clean interior of shelter.
- (3) Check all cords and cables for cracked, cut, and frayed insulation, and for good contact.
- (4) Check operation of panel lights in accordance with instructions in technical manuals covering individual equipment.
- (5) Check meters for zero adjustment.
- (6) Check whip antenna sections, bases, and mountings.
- (7) Inspect and check antenna masts for loose joints or bases.
- (8) Check guy ropes for frayed or broken strands.
- (9) Check and inspect all antenna lead-ins and feeders. The feeders or lead-ins should have no sharp right-angle bends.

Note. Gasoline will not be used as a cleaning fluid for any purpose. Solvent (SD) is available as a cleaning fluid through established supply channels.

b. WEEKLY.

Caution: Disconnect all power before performing the following operation. Upon completion, reconnect power and check for satisfactory operation.

- (1) Clean interior of shelter and all cabinets, exterior of all chassis, and all parts accessible without removal from cabinets.
- (2) Weekly check also includes complete daily check and inspection.

c. MONTHLY. Make visual inspection of the following. Tighten, clean, and/or replace if necessary:

- (1) Tubes and sockets.
- (2) All capacitors for corrosion.

- (3) Resistors, for extreme blistering or discoloration, and other evidence of overheating.
- (4) Switches, for dirt, corrosion, loose contacts, and unsatisfactory mechanical action.
- (5) Multiple connectors, for dirt, corrosion, and loose contacts.
- (6) Wires, cords, and cables, for cracked, cut, and frayed insulation.
- (7) Terminal strips and connectors, for dirt and loose connections.
- (8) Potentiometers and switches, for unsatisfactory electrical and mechanical operation.
- (9) Mountings, machine screws, and nuts, for mechanical looseness.
- (10) MFP (moisture-fungiproof) coatings, for breaks. (Retouch with a brush, if necessary.)
- (11) Finish of all equipment, for scratches and bare spots. (Retouch, if necessary.)
- (12) Unshielded variable capacitors, for dirt, corrosion, and bent plates.
- (13) All unshielded coils for dirt, corrosion, and damaged turns.
- (14) All insulators, for cracks and dirt.
- (15) Relay contacts, for pits and build-ups, and for alignment.
- (16) Blower, for dirt and proper operation.
- (17) All visible terminals and connections at shelter and power unit, for loose connection and corrosion.

Note. In order to inspect, check, and perform maintenance on Antenna Tuning Unit BC-939-(*), mounted on top of the transmitter, the antenna tuning unit must be removed by loosening four wingnuts.

Note. Upon completion reconnect power for all equipment and check for satisfactory operation.

Section III. LUBRICATION

76. Detailed Lubrication Instructions

a. GENERAL.

- (1) The type of lubricant to be used, the interval, and the specific instructions for each part listed under Radio Set AN/GRC-26 are given in the respec-

tive technical manuals covering the components of Radio Set AN/GRC-26. Lubrication for the blower unit motor is given in *b* below.

- (2) Gasoline will not be used as a cleaning fluid for any purpose. When the unit is overhauled or repairs are made,

parts should be cleaned with solvent (SD).

- (3) Carbon tetrachloride will be used as a cleaning fluid only in the following cases: on electrical equipment where inflammable solvents cannot be used because of fire hazard, and for cleaning electrical contacts including relay contacts, plugs, commutators, etc.

Note. Before applying lubricant, be sure parts are clean and free from dust and dirt. Lubricate sparingly. Wipe off excess lubricant.

- (4) Apply Oil, lubricating, preservative, special (PL-Special) sparingly to springs and loops of all helical springs, to prevent wear and rust.

b. SHELTER VENTILATING BLOWER. Lubricate with Oil, engine (OE 10) in oil cups located at each end of motor.

Note. Some motors are equipped with sealed bearings, which are prelubricated for the life of the bearings. Do not attempt to disassemble or lubricate motors of this type. If these motors fail due to lack of lubricant, replace the motors.

c. MECHANICAL DEVICES OF SHELTER. Lubricate all movable parts of the shelter, such as hinges, latches, etc., with a light coat of oil (OE 10) to insure against rust and corrosion and provide for better operation. Wipe off excess lubricant to prevent contamination by dirt or dust.

d. RACE-WAYS OF CABINETS. The race-ways of cabinets should be lubricated with oil (PL-Special) to assure easy removal of chassis for repairs.

Note. Intervals given are maximums for normal 8-hour day operation. For abnormal conditions or activities, intervals should be shortened to compensate.

77. Parts of Radio Set AN/GRC-26 Lubricated by Manufacturer

The parts of the equipment which have been lubricated by the manufacturer prior to delivery of the equipment are as follows:

Major component	Parts lubricated	Commercial lubricant	Signal Corps equivalent
Shelter S-55/GRC	Roller bearings in all wall cabinets.	.....	Oil (PL-Special).
	Hinges for door, windows, cabinets, locking devices, and snap fasteners.	.....	Oil (PL-Special).
	Blower and blower motor.	SAE 10	Oil (OE 10).

78. Lubrication Under Unusual Conditions

a. ARCTIC REGIONS. Lubricants which are satisfactory at moderate temperatures stiffen and solidify at subzero temperatures; as a result, moving parts bind or become inoperative. Use the grade of lubricant recommended for the equipment in Arctic regions. Refer to TM 11-904 for lubricating information on Power Unit PE-95-G. When preparing the equipment for low-temperature operation, see that the lubricants used for moderate temperatures are thoroughly removed. Even small amounts of such lubricants, if allowed to remain, may impair the operation of moving parts. Be sure to use the lubricant specified for low-temperature operation.

b. TROPICAL REGIONS. High temperatures and moisture due to rain, condensation, etc., may cause lubricants which are normally satisfactory to flow from moving parts and other surfaces. These bearing surfaces will wear excessively, and hinges, fastenings, and other parts will be damaged or destroyed by rust and corrosion. Inspect the equipment daily and lubricate it as required to insure efficient operation, using lubricants suitable for high temperatures.

c. DESERT REGIONS. Dust and sand infiltration into the equipment causes grit in the lubricants and will seriously impair and damage the moving parts of the set. Hot dry temperatures cause the lubricants to flow from the moving parts, and conditions similar to those described in b above will result. Use lubricants suitable

for high temperatures. Inspect and clean the equipment daily.

d. LUBRICANTS. For operation under climatic conditions in which extreme temperatures are encountered, the lubricants listed below should be used in place of those specified.

Lubricant specified	For temperature		
	Above +32°F	+32°F to 0°F	Below 0°F
OE10	OE10	PL-Special	PL-Special
GL	GL	GL	PL-Special
WB	WB	GL	GL

Note.

OE 10	Oil, engine, SAE 10.
PL-Special	Oil, lubricating, preservative, special.
GL	Grease, lubricating, special.
WB	Grease, general purpose, No. 2.

Section IV. WEATHERPROOFING

79. Weatherproofing

a. GENERAL. Signal Corps equipment, when operated under severe climatic conditions such as prevail in tropical, Arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

b. TROPICAL MAINTENANCE. A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is fully explained in TB SIG 13 and TB SIG 72.

c. WINTER MAINTENANCE. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are fully explained in TB SIG 66.

d. DESERT MAINTENANCE. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are fully explained in TB SIG 75.

e. LUBRICATION. The effects of extreme cold and heat on materials and lubricants are ex-

plained in TB SIG 69. Observe all precautions outlined in TB SIG 69 and pay strict attention to all lubrication orders when operating equipment under conditions of extreme cold or heat. Refer to section III of this chapter for detailed instructions.

80. Rustproofing and Painting

a. When the finish on the case has been badly scarred or damaged, rust and corrosion can be prevented by touching up bare surfaces. Use No. 00 or No. 000 sandpaper to clean the surface down to the bare metal; obtain a bright smooth finish.

Caution: Do not use steel wool. Minute particles frequently enter the equipment case and cause harmful internal shorting or grounding of circuits.

b. When a touch-up job is necessary, apply paint with a small brush. Remove rust from the case by cleaning corroded metal with solvent (SD). In several cases it may be necessary to use solvent (SD) to soften the rust, and sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations. See TM 9-2851.

Section V. TROUBLE SHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

81. Scope

a. The trouble-shooting and repair work that can be performed at the organizational maintenance level (operators and repairmen) is necessarily limited in scope by the tools, test equipment, and replaceable parts issued, and by the existing tactical situation. Accordingly,

trouble shooting is based on the performance of the equipment and the use of the senses in determining such trouble as burned-out tubes, fuses, etc.

b. The following paragraphs in this section help in determining which of the components, such as the receivers or transmitters, are at

fault and in localizing the fault in that component to the defective stage or item, such as a tube or fuse.

82. Visual Inspection

a. Radio Set AN/GRC-26 is much too complicated to start trouble-shooting without a system. Often, one or more of the pilot lamps will not light. It will indicate which piece of equipment is not operating properly. Check that all plugs and cords are properly connected.

b. A common cause of trouble is improper setting of one or more switches, especially when service other than normal full duplex is attempted. Check this.

c. Check that the type of operation and service is one that is permitted by the tactical situation (for instance, full- or half-duplex services should not be attempted during mobile operation) and check that frequencies are chosen properly when the whip antennas are being used.

83. System Sectionalization of Trouble to a Component

System sectionalization consists of determining whether the trouble is in the receiver, converter, control unit, exciter, transmitter, speech amplifier, or the teletypewriter equipment.

a. Operate the entire set and observe its performance. See equipment performance checklist (par. 85) for normal operating indications.

b. If the entire radio set is dead and the lights do not light, the trouble undoubtedly is in the power source.

c. If only one component is dead, the trouble is in that component and is probably a fuse. Do not continue to burn out fuses before looking elsewhere to determine the source of the trouble.

d. If the signal is present in one component (as indicated by proper meter reading such as polar on converter), but there is no indication of a signal in the component which follows it, the trouble probably is a defective or disconnected cord or connector.

Note. The order in which one component follows the other is shown on the complete block diagram (fig. 75).

e. If the teletypewriter equipment does not operate properly, the trouble is probably in the TT cords, plugs, or jacks, or in the setting of

Radioteletypewriter Control C-535/GRC-26.

f. To find the source of excessive noise, remove the antenna cord from the operating receiver. If noise becomes less pronounced or stops, the trouble is in the antenna, or is external to the shelter. If noise persists, try one receiver at a time. If this does not help, noise is not due to receivers.

g. By the use of procedures similar to the simple checks given above, the trouble can often be isolated to a particular unit.

h. If these checks are not productive, use the equipment performance checklist (par. 85) as explained in paragraph 84.

84. Trouble Shooting by Using Equipment Performance Checklist

a. GENERAL. The equipment performance checklist (par. 85) will help the operator to locate trouble in the equipment. The list gives the item to be checked, the conditions under which the item is checked, the normal indications and tolerances of correct operation, and the corrective measures the operator can take. *To use this list, follow the items in numerical sequence.*

b. ACTION OR CONDITION. For some items, the information given in the action or condition column consists of various switch and control settings under which the item is to be checked. For other items, it represents an action that must be taken to check the normal indication given in the normal indications column.

c. NORMAL INDICATIONS. The normal indications listed include the visible and audible signs that the operator should perceive when he checks the items. If the indications are not normal, the operator should apply the recommended corrective measures.

d. CORRECTIVE MEASURES. The corrective measures listed are those the operator can make without turning in the equipment for repairs. A reference in the checklist to chapter 6 indicates that the trouble probably cannot be corrected during operation and that trouble shooting by an experienced repairman is necessary. If the set is completely inoperative, or if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained and if the set is not com-

pletely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

85. Equipment Performance Checklist

a. PREPARATORY OPERATIONS.

(1) *Shelter S-55/GRC.*

Item No.	Item	Action or condition
1	Circuit breaker.....	Set at OFF position.

(2) *Frequency Shift Exciter O-39(*)/TRA-7.*

Item No.	Item	Action or condition
2	AC SUPPLY switch.	Set at off (down) position.
	OVEN switch.....	Set at off (down) position.
	TEST OSC 850— switch.	Set at OFF position.
	TEST key.....	Set at NORM position.

(3) *Radio Transmitter T-213/GRC-26.*

Item No.	Item	Action or condition
3	FILAMENT POWER switch.	Set at off (down).
4	FILAMENT VOLTAGE control	Set to full counter-clockwise position.
5	HIGH VOLTAGE PROTECT switch	Set at off (NORM-AL).
6	EXCITER PLATE POWER switch.	Set at off (down).
7	C.W.-PHONE switch.	Set at C.W. position
8	EXCITATION METER switch.	Set at INT. AMP. GRID.
9	BAND SWITCH....	Set to channel corresponding to desired tuning unit.
10	Tuning Unit.....	Check selection of proper tuning unit.
11	Coil Unit.....	Check selection of proper coil unit for frequency desired.

(4) *Frequency Meter BC-221-AJ or -AL (for other models, refer to TM 11-300).*

Item No.	Item	Action or condition
12	POWER switch.....	Set at OFF position.
13	ON-OFF switch (of power cord).	Set at OFF position.

(5) *Dual Diversity Converter CV-31(*)/TRA-7.*

Item No.	Item	Action or condition
14	AC SUPPLY switch.	Set to off (down) position.
15	PLATE power switch.	Set in off (down) position.
16	OUTPUT switch....	Set to NORMAL position.
17	METER B switch...	Turn to INPUT.
18	DRIFT COMPENSATOR switch.	Set to out (down) position.

(6) *Radio Receiver R-336/GRC-26.*

Item No.	Item	Action or condition
19	OFF-M.V.C.-A.V.C. switch.	Turn to OFF position.
20	SEND-REC. switch.	Set to SEND position.
21	BAND CHANGE switch.	Set to correct band.
22	C.W.-OSC. switch...	Set to OFF position.
23	FAST TUNING control.	Tune to approximate frequency to be used.
24	CRYSTAL PHASING	Turn to OUT position.

(7) *Rectifier RA-87.*

Item No.	Item	Action or condition
25	ON-OFF switch.....	Set to OFF position.

(8) *Control Unit C-292(*)/TRA-7.*

# Item No.	Item	Action or condition
26	AC SUPPLY switch.	Set to off (down) position.
27	TRANSMITTER switch.	Set to off (down) position.

(9) *Radioteletypewriter Control C-535/GRC-26.*

Item No.	Item	Action or condition
28	LEFT TT-55/MGC switch.	Set at SEND.
29	RIGHT TT-55/MGC switch.	Set at RECEIVE.
30	REPERFORATOR CONNECTED TO switch.	Set at PUNCH TAPE.

(10) Teletypewriter TT-55/MGC.

(11) Perforator-Transmitter TT-56/
MGC.

Item No.	Item	Action or condition
31	Motor ON-OFF switch.	Set to OFF.

Item No.	Item	Action or condition
32	Perforator POWER switch.	Set to OFF (up) position.
33	Transmitter-distributor MOTOR ON-MOTOR OFF switch.	Set to MOTOR OFF position.
34	Transmitter-distributor STOP-SEND switch.	Set to STOP position.

b. START OPERATIONS.

(1) Power Unit PE-95-G.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
35	CIRCUIT BREAKER switch.	Set at OFF.....		
36	START button.....	Push START button.....	Power unit starts.....	Check for discharged battery. Refer to TM 11-904.
37	CIRCUIT BREAKER switch.	Set to ON.....	Normal line voltage (117 volts indicated on AC VOLTS meter on power unit panel.	Check circuit breaker. Refer to TM 11-904.

(2) Shelter S-55/GRC.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
38	Circuit breakers.....	Set to ON.....	Shelter lamps go on.....	Check Power Cable Assemblies CX-1165/U, CX-1166/U from Power Unit PE-95-G or commercial source if used.

(3) Frequency Shift Exciter O-39(*)/ TRA-7.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
39	AC SUPPLY and OVEN switches.	Throw to ON position at least 2 hours before initial adjustment.	AC SUPPLY and OVEN indicator lamps light.	Check power Cord CX-962 /TRA-7, fuses and lamps.
40	OSCILLATOR RANGE switch.	Set in accordance with calibration chart.	.....	Refer to paragraph 46 or to part five, TM 11-278.

(4) Radio Transmitter T-213/GRC-26.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
41	FILAMENT POWER SWITCH.	Set switch to on (up). Wait 1 minute for filaments to reach operating temperature.	Green pilot lamp and PLATE TUNING dial on transmitter light.	If both lamps are out, check fuses FS-1, FS-2, FS-4, and Cord CD-763.
42	FILAMENT VOLTAGE control.	Turn partially clockwise....	Red pilot lamp on Speech Amplifier BC-614-(*) lights. FIL. VOLTAGE meter reads 5 to 5.3 volts.	Replace lamp, check Cord CD-764. Adjust FILAMENT VOLTAGE control.

(5) Frequency Meter BC-221-AJ or -AL (for other models, refer to TM 11-300).

Item No.	Item	Action or condition	Normal Indications	Corrective measures
43	Power switch (in power cord).	Set at ON.....	Yellow indicator lamp lights.	Check a-c cord and switch.
44	Operation switch.....	Turn to XTAL CHK, position.	Beat notes should be heard in head-set (connected to PHONES jack on frequency meter).	Check that phone plug is fully inserted.
45	GAIN control.....	Set to midposition.....		
46	Tuning dial.....	Rotate back and forth several turns.		

(6) Dual Diversity Converter CV-31(*)/ TRA-7.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
47	AC SUPPLY switch.....	Throw to ON position.....	White-capped pilot lamp should light.	Check power Cord CX-954/TRA-7, fuses and lamp.
48	PLATE power switch.....	Throw to ON position.....	Red-capped pilot lamp should light.	Check power Cord CX-954/TRA-7, fuses and lamp.

(7) Radio Receivers R-336/GRC-26.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
49	OFF-M.V.C.-A.V.C. switch.	Turn to M.V.C. position ...	Dial lamps light.....	Check fuses on front panel. Check power cord and plugs. See part four, TM 11-850.
50	VOL control.....	Turn clockwise.....	Increased signal or noise is heard.	

(8) Rectifier RA-87.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
51	ON-OFF switch.....	Set to ON position.....		Check power selector switch (50-60 cycles) position. Refer to TM 11-957.

(9) Control Unit C-292(*)/TRA-7.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
52	AC SUPPLY switch.....	Set to ON position.....	AC SUPPLY indicator lamp should light.	Check lamp and fuses in control unit. Check a-c outlet. Check Cord CX-959/TRA -7. Refer to TM 11-278.

(10) Receiving Teletypewriter TT-55/MGC.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
53	Motor ON-OFF switch....	Set to ON position.....	Motor runs.....	Check power selector switch for correct 50-60 cycle position.

(11) Sending Teletypewriter TT-55/MGC.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
54	Motor ON-OFF switch....	Set to ON position.....	Motor runs; machine holds..	Check TT power selector switch for correct 50-60 cycle position. Check a-c cord. Check that LEFT TT-55/MGC switch is set at SEND.

(12) Perforator-Transmitter TT-56/MGC.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
55	Perforator POWER switch.	Set to ON (down).....	Motor runs. Machine runs closed.	Check motor connection box a-c cord. See TM 11-2223. Check Rectifier RA-87. Check send and receive cords of perforator. Check Special Purpose Cable Assembly CX-1120/U. Refer to TM 11-2222.
56	Transmitter-Distributor MOTOR ON-MOTOR OFF switch.	Set to MOTOR ON.....	Motor runs.....	
57	Transmitter-Distributor STOP-SEND switch.	Set to SEND.....	Machine runs closed.	

c. EQUIPMENT PERFORMANCE OPERATIONS.

(1) Frequency Shift Exciter O-39(*)/TRA-7.

Item No.	Item	Action or condition	Normal Indications	Corrective Measures
58	BUFFER TUNING control.	All dials and controls set in accordance with charts.	BUFFER INDICATOR lamp glows with maximum brilliance when BUFFER TUNING dial is tuned to resonance.	Refer to paragraph 46 or to part five, TM 11-278.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
59	TEST key.....	TEST key set at MARK or SPACE. BUFFER TUNING dial rotated in either direction With transmitter alined to exciter frequency and TRANSMITTER switch on control unit in ON position: Set on MARK. Set on SPACE; Set on NORM.	BUFFER INDICATOR lamp glows and normal meter readings are observed on the transmitter in all three positions.	Refer to paragraph 46 or part five, TM 11-278. Check Cord CX-961/TRA-7 (blue.)
60	Headset.....	With plug inserted into PHONE 850—TEST jack, VOLUME 850 TEST control set to mid-position, and TEST OSC. switch set to 850—(on) position.	850-cycle tone in headset...	Refer to paragraph 46 or part five, TM 11-278.
61	TEST OSC. 850—(on) position.	Throw to 850—(on) position.	850-cycle tone heard in phones.	Refer to paragraph 46 or part five, TM 11-278.
62	VOLUME control.....	Rotate in either direction...	Level of 850-cycle tone will vary.	Refer to paragraph 46 or part five, TM 11-278.
63	OSCILLATOR TUNING control.	TEST OSC. 850—switch in OFF position. Test key in MARK position. Frequency meter set to assigned frequency. Rotate OSCILLATOR or TUNING dial in either direction.	Zero beat obtained in phones when exciter oscillator is tuned to operating frequency.	Refer to paragraph 46 or part five, TM 11-278.
64	SHIFT dial.....	TEST OSC. 850—switch in 850—(on) position. TEST key in SPACE position. Rotate SHIFT dial very slightly in either direction. Transmitter alined to exciter frequency.	A second audio tone heard with 850-cycle tone. Second tone varies in frequency as SHIFT dial is adjusted, and zero beat is obtained when properly adjusted. This point is also indicated on 850—TEST indicator tube by very slow flutter.	Refer to paragraph 46 or part five, TM 11-278.

(2) Radio Transmitter T-213/GRC-26.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
65	EXCITATION METER...	TEST key on exciter unit set to MARK. EXCITATION METER SWITCH set to— DOUBLER PLATE INT. AMP. GRID INT. AMP. PLATE P.A. GRID	EXCITATION METER reads— 25 to 45 ma. 1 to 8 ma. 125 to 175 ma. 60 to 100 ma.	If the meter does not indicate in any position, check— Cord CX-961/TRA-7. Installation and tuning of the tuning unit. Setting of the BAND SWITCH.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
66	P. A. PLATE meter.....	TEST key on exciter set to MARK.	200 to 300 ma.....	<p>Position of the M.O.-XTAL switch on the tuning unit. It should be in XTAL position.</p> <p>If the meter readings are improper, retune the transmitter; replace tube V-8 V-9, V-10, or V-11, if necessary.</p> <p>Check fuse FS-4.</p> <p>Check tuning of P. A. TUNING control.</p> <p>Check plate coil and the position of the link.</p> <p>Check Cord CX-961/TRA-7 (blue).</p> <p>Operate the overload relay reset switch.</p> <p>Check fuses FS-1, FS-2, and FS-3.</p> <p>Check all interlock switches. Replace V-6, V-7, or V-16, if necessary.</p>

(3) Dual Diversity Converter CV-31(*)/TRA-7.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
67	-400-volt supply.....	METER B switch in -400V position.	Meter B indicates between 65 and 95 to the left.	Refer to part five, TM 11-278.
68	-150-volt supply.....	METER B switch in -150V position.	Meter B indicates between 20 and 40 to the left.	Refer to part five, TM 11-278.
69	Regulated -150-volt supply.	METER B switch in REG -150V position.	Meter B indicates between 20 and 40 to the left.	Refer to part five, TM 11-278.
70	Regulated +150-volt supply.	METER B switch in REG +150V position.	Meter B indicates between 20 and 40 to the right.	Refer to part five, TM 11-278.
71	+275-volt supply.....	METER B switch in +275V position.	Meter B indicates between 50 and 70 to the right.	Refer to part five, TM 11-278.
72	Input signal.....	METER B switch in INPUT position.	Peak indication on meter B of 100 to the right.	Increase receiver volume.
73	Neutral loop current.....	METER B switch in NEUTRAL position.	Meter B indicates +60 (0.060 amp) for mark signals, 0 for space signals.	Retune receivers.
74	Polar loop current.....	METER B switch in POLAR position.	Meter B indicates +25 (0.025 amp) for mark signals, -25 for space signals.	Adjust NEUTRAL OUTPUT control.
75	Channel A + B signal.....	METER B switch in CHAN A + B position.	Drift compensator: out: meter B indicates +100 (mark) and -100 (space). Drift compensator in: meter B indicates +70 (mark) and -70 (space).	Adjust POLAR OUTPUT MARK, and SPACE CONTROLS.
76	Output of channel B discriminator.	METER B switch in CHAN B position, receiver A volume reduced.	Meter B indicates -50 for steady mark signal, averages 0 for miscellaneous signals.	Adjust DRIFT COMPENSATOR, LIMITER control.
				Check tuning of CHANNEL B, FINE TUNING control and tuning of receiver B. (Frequency shift of transmitter may not be 850 cycles.)

Item No.	Item	Action or condition	Normal Indications	Corrective measures
77	Output of channel A discriminator.	Receiver B volume reduced.	Meter A indicates ± 50 for a steady mark signal, averages zero for miscellaneous TT signals.	Check tuning of CHANNEL A, FINE TUNING control and tuning of receiver A. (Frequency shift of transmitter may not be 850 cycles.)
78	Diversity output of channel A and B discriminators.	METER B switch in CHAN B position.	Reading on meter A will exceed reading of meter B about 50 percent of the time when steady mark signal is received.	
79	Drift compensator circuit...	METER B switch in COMP AMP position, LIMITER control in full clockwise position.	Minimum kicks on meter B while receiving signals.	Adjust AMP GAIN control for minimum meter kicks.

(4) Radio Receiver R-336/GRC-26.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
80	ALIGN INPUT control....	Rotate.....	Maximum noise peaks or signal can be obtained.	Check antenna. Check Cord CG-67/MRQ-2.
81	VERNIER control.....	Adjust.....	Use for fine adjustment of receiver tuning.	
82	CW-OSC ADJUST control.	Rotate control in either direction.	Beat note can be heard to pass through zero beat.	Retune signal, using VERNIER control. Refer to TM 11-850.
83	Headset or loudspeaker....	Set operating normally. Plugs inserted into jacks of Control Box C-345(*) /MRC-2.	Signal is heard.....	Check plugs and cable connections. Tune receiver.

(5) Control Unit C-292(*)/TRA-7.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
84	-150-volt supply.....	METER switch in -150 VOLT SUPPLY position.	Meter indicates 75 ± 5 to the left of zero.	Adjust -150V ADJ control on top of chassis.
85	+300-volt supply.....	METER switch in +300 VOLT SUPPLY position.	Meter indicates 75 ± 5 to the right of zero.	Adjust +300V ADJ control on top of chassis.
86	-300-volt supply.....	METER switch in -300 VOLT SUPPLY position.	Meter indicates 75 ± 10 to the left of zero.	Refer to part five, TM 11-278.
87	Send extension current....	METER switch in SEND EXT-CURRENT position. BREAK key on send teletypewriter: depress (space). release (mark).	Meter indicates 0. Meter indicates 75 (60 ma) to the right of zero.	Check Cord CX-956/TRA-7.
88	Receive extension current...	Meter switch in REC EXT-CURRENT position.	.....	Check that NORMAL-EXTENSION switch on TT control is in NORMAL position if no extension equipment is being used. Check plugs and cord on send teletypewriter. Refer to cording diagram, figure 78.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
89	Balance circuit.....	Press RECEIVING TEST SPACE button on control unit. Press RECEIVING TEST MARK button on control unit.	Meter indicates 0..... Meter indicates 75 (60 ma) to the right of zero for full-duplex operation; 0 for half-duplex operation; or one way reversible.	Adjust EXTENSION CURRENT control. Check Cord CX-956/TRA-7. Check plugs on receiving teletypewriter. Check that NORMAL-EXTENSION switch on TT control is in NORMAL position if no extension equipment is being used. Refer to cording diagram, figure 78. Adjust BALANCE ADJ control on top of chassis for equal deflections.
90	Receiving line current.....	METER switch in BALANCE position, alternately depress RECEIVING TEST MARK, SPACE buttons on control unit.	Equal indications (approximately 75) each side of zero (MARK to the right, SPACE to the left).	Refer to TM 11-278. Check Cord CX-957/TRA-7. Check Special Purpose Cable Assembly CX-1151/U.
91	TRANSMITTER remote switch.	METER switch in REC LINE CURRENT position; operate OUTPUT switch of converter to MARK and SPACE alternately.	Meter reading of 75 (25ma) ± 10 to the right of zero for mark signal, and 75 (25 ma) ± 10 to the left of zero for space signals.	Set to off (down) position. Green TRANSMITTER indicator lamp should go out; transmitter and exciter plate power should be off.
92	Send line current.....	Meter switch in SEND LINE CURRENT position. Depress BREAK key (space) on send TT. Release BREAK key on send TT (mark). With exciter TEST key set at NORM, check frequency shift.	Meter reads 75 (25 ma), to the left of zero. Meter reads 60 (20 ma), to the right of zero. Shift should be 850 cycles..	Refer to TM 11-278. Check Cord CX-958/TRA-7. Check Cord CX-961/TRA-7 (blue and red). Check position of TEST key on exciter (should be in NORM position). Adjust SENDING LINE CURRENT SPACE and MARK controls. ADJUST SENDING LINE CURRENT SPACE, and MARK controls. Adjust shift and exciter.

(6) Receiving Teletypewriter TT-55/MGC.

Item No.	Item	Action or condition	Normal Indications	Corrective Measures
93	RECEIVING TEST, MARK Key on control unit.	Momentarily depress MARK key on control unit.	Teletypewriter runs closed..	Check that RIGHT TT-55/MGC switch is set at RECEIVE. Check jacks, plugs, on receiving TT.
94	RECEIVING TEST,	Momentarily depress	Machine runs open.....	Refer to TM 11-352.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
95	SPACE key on control unit. Manual carriage return lock bar.	SPACE key on control unit. Press carriage return lock bar.	Carriage returns to left side of machine.	Refer to TM 11-352.

(7) *Sending Teletypewriter TT-55/MGC.*

Item No.	Item	Action or condition	Normal Indications	Corrective measures
96	BREAK key.....	Depress BREAK key momentarily.	Control unit meter indicates 75 to the left of zero. Machine runs open.	
97	Space bar.....	Hold space bar down momentarily.	Carriage travels to right, stops when released.	
98	Manual carriage return lock bar.	Press carriage return bar..	Carriage returns to the left side of machine.	
99	Test message.....	SEND-REC.-BREAK switch in SEND position. Send test message.	Machine types; same test message should appear on message blank.	Refer to TM 11-352.

(8) *Perforator-Transmitter TT-56/MGC.*

Item No.	Item	Action or condition	Normal Indications	Corrective measures
100	Line BREAK key	Press..... Release.....	Machine runs open. Machine runs closed.	
101	Space bar	Hold down for 10 seconds.. Release.....	Machine runs open. Signal lamp lights, indicating end of line.	Press LINE FEED and CAR RET keys.
102	CAR RET key.....	Press.....	Lamp goes out.....	Check lamp.
103	Test message.....	Type test message.....	Tape should be printed and perforated correctly.	Refer to TM 11-2223.
104	Transmitter-distributor tight-tape stop lever.	Place tight-tape stop lever in down position.	Tape feeds.	Refer to TM 11-2223 and TM 11-2201.
105	Transmitter-distributor test tape.	Raise tight-tape stop lever.. Place test tape in TD and send.	Tape stops feeding. Same message appears on send TT.	Refer to TM 11-2201 and TM 11-2223.

(9) *Final equipment test.*

Item No.	Item	Action or condition	Normal Indications	Corrective measures
106	Test message.....	Send test message by pre-arrangement with a distant station. Tune receivers to distant station. Have distant station send test message.	Test message should be printed correctly on receiving TT at distant station. Test message from distant station should be printed correctly on receiving TT as well as on sending TT at distant station.	

d. STOP PROCEDURES.

(1) *Perforator-Transmitter TT-56/MGC.*

Item No.	Item	Action or condition	Normal Indications	Corrective measures
107	Perforator POWER switch.	Set to OFF (up) position.....	Motor stops.....	Refer to TM 11-2223.
108	Transmitter-distributor STOP-SEND switch.	Set at STOP position.....		Refer to TM 11-2222.
109	Transmitter-distributor MOTOR ON-MOTOR OFF switch.	Set to MOTOR OFF posi- tion.	Motor stops.....	

(2) *Teletypewriter TT-55/MGC.*

Item No.	Item	Action or condition	Normal Indications	Corrective measures
110	Sending TT motor ON-OFF switch.	Set to OFF position.....	Motor stops.....	Refer to TM 11-352.
111	Receiving TT motor ON- OFF switch.	Set to OFF position.....	Motor stops.....	

(3) *Control Unit C-292(*)/TRA-7.*

Item No.	Item	Action or condition	Normal Indications	Corrective measures
112	TRANSMITTER switch....	Set to off (down) position. TEST key in NORM position.	Green TRANSMITTER indicator lamp should go out. Transmitter plate power goes off.	Refer to TM 11-278.
113	AC SUPPLY switch.....	Set to off (down) position..	AC SUPPLY indicator lamp should go out.	Refer to TM 11-278.

(4) *Rectifier RA-87.*

Item No.	Item	Action or condition	Normal Indications	Corrective measures
114	Power ON-OFF switch....	Set to OFF position.....		Refer to TM 11-957

(5) *Radio Receiver R-336/GRC-26.*

Item No.	Item	Action or condition	Normal Indications	Corrective measures
115	OFF-M.V.C.-A.V.C. switch.	Turn to OFF position.....	Dial lamp goes out.....	

(6) *Dual Diversity Converter CV-31(*)/TRA-7.*

Item No.	Item	Action or condition	Normal Indications	Corrective measures
116	PLATE power switch.....	Throw to off (down) posi- tion.	Red-capped pilot lamp goes out.	
117	AC SUPPLY switch.....	Throw to off (down) posi- tion.	White-capped pilot lamp goes out.	

(7) Frequency Meter BC-221-AJ or -AL (for all other models, refer to TM 11-300).

Item No.	Item	Action or condition	Normal Indications	Corrective measures
118	POWER switch.....	Set to OFF position.....		
119.	ON-OFF switch of a-c cord.	Set to OFF position.....	Yellow pilot lamp goes out.	

(8) Radio Transmitter T-213/GRC-26.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
120	FILAMENT POWER switch.	Set to off position.....	White light goes out and filament power shuts off.	

(9) Frequency Shift Exciter O-39(*)/TRA-7.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
121	TEST key.....	Set to NORM..... Transmitter switch on control unit set at off (down) position.	BUFFER INDICATOR lamp goes out.	
122	AC SUPPLY and OVEN switches.	Set at off (down) position..	OVEN and dial lamps go out.	

(10) Shelter S-55/GRC.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
123	Circuit breakers.....	Set at OFF.....	Shelter lights go out.....	

(11) Power Unit PE-95-G.

Item No.	Item	Action or condition	Normal Indications	Corrective measures
124	CIRCUIT BREAKER switch.	Set at off position.....		
125	STOP button.....	Press STOP button firmly until engine stops.	Engine stops. AC VOLTS meter reads 0.	

CHAPTER 4

AUXILIARY EQUIPMENT

86. Auxiliary Equipment for Radio Set AN/GRC-26

Radio Set AN/GRC-26 may be used with many standard radio communications equipments. The type to be used depends upon the tactical situation and individual communication requirements. An extra shelf is provided in the front of Shelter S-55/GRC to accommodate auxiliary equipment, and a separate whip antenna is available.

87. Similar Equipment

Radio Transmitters BC-610-E, BC-610-F,

and BC-610-G, similar to Radio Transmitter T-213/GRC-26, are used in Radio Sets SCR-399-(*) and SCR-499-(*). Radio Receiver BC-342-N, similar to Radio Receiver R-336/GRC-26, is widely used in Army signal communications equipments. Radio Set AN/MRC-2(*) is similar to Radio Set AN/GRC-26; however, Radio Set AN/MRC-2(*) is capable of operation over longer distances, and has three operating shelters. Mobile operation is not possible with Radio Set AN/MRC-2(*). Radio Receiver Assembly OA-65/MRC-2 is similar to the set-up of the two Radio Receivers R-336/GRC-26 which are used in Radio Set AN/GRC-26.

CHAPTER 5

THEORY

Section I. THEORY OF RADIO SET AN/GRC-26

88. General

Radio Set AN/GRC-26 consists of an assembly of equipments which are covered by individual technical manuals containing block diagrams and circuit theory. Refer to TM 11-278 for theory of operation of all components of radioteletype equipment. Theory of Speech Amplifier BC-614-H is given in TM 11-281. Theory of Rectifier RA-20-B, Radioteletypewriter Control C-535/GRC-26, and Control Box C-345A/MRC-2 is given in paragraphs 93, 94, and 95, respectively. Other components are modified versions of standard Signal Corps equipments and are described in paragraphs 89 through 92.

89. Radio Transmitter T-213/GRC-26

Radio Transmitter T-213/GRC-26 consists of Radio Transmitter BC-610-F or BC-610-G modified by the addition of socket SO-10 (Signal Corps Socket SO-239), across the r-f output terminals to permit connection of a transmission line. Complete information on theory of Radio Transmitter BC-610-F is given in TB SIG 220, TM 11-281, and TM 11-4057.

90. Teletypewriter TT-55/MGC

Teletypewriter TT-55/MGC consists of a modified Teletypewriter TG-7-B. Theory of operation is covered in TM 11-352. The following modifications have been made:

- a. A power lead filter has been added.
- b. A 0.01-uF capacitor has been added from one side of the a-c line to ground.
- c. A 0.1-uF capacitor has been added from one side of the selector magnet lead to ground.
- d. The case has been grounded to the keyboard by a flexible wire lead.

91. Perforator-Transmitter TT-56/MGC

Perforator-Transmitter TT-56/MGC consists of Reperforator-Transmitter TG-26-A modified by the addition of a 0.1-uF capacitor

for noise suppression purposes. The capacitor has been added from the common junction of two 500-ohm resistors and the motor field winding to ground. Refer to TM 11-2201 for the theory of operation of Perforator-Transmitter TG-26-A.

92. Radio Receiver R-336/GRC-26

(fig. 77)

Radio Receiver R-336/GRC-26 consists of Radio Receiver BC-342-N modified to minimize frequency drift and to facilitate operation in a dual-diversity reception circuit with associated radioteletype equipment. Circuit theory is given below for modified portions of the receiver. For theory of operation other than the material given below, refer to TM 11-850.

a. MODIFICATION OF H-F OSCILLATOR STAGE (fig. 48). The h-f oscillator tube (V-4), a tube type 6C5, has been replaced by a tube type 6J5. In some cases, components of better temperature characteristics have been substituted, but theory of these items remains the same. The variable tuning capacitors connected across the grid coils on each band have been replaced with smaller variable capacitors of from 3 to 20 uuf (C-19, C-20, C-21, C-22, C-23, and C-24). On bands B, C, E, and F, temperature compensating capacitors C-104, C-105, C-106, and C-107, respectively, have been added in parallel with the variable capacitors to compensate for the reduced capacity and for the inductance change in the coils due to temperature changes. Oscillator coils L-19, L-22, and L-23 have been rewound, as necessary, for new circuit constants. Capacitors C-118 and C-114 are connected from the grid of the oscillator tube to ground to compensate for variations in the grid circuit due to temperature fluctuations. Capacitor C-40 was replaced with two ceramic type capacitors, a 100 uuf (reference symbol remains C-40) in parallel with a 25 uuf (C-119). Both sides of the r-f oscillator tube filaments were placed at r-f ground potential.

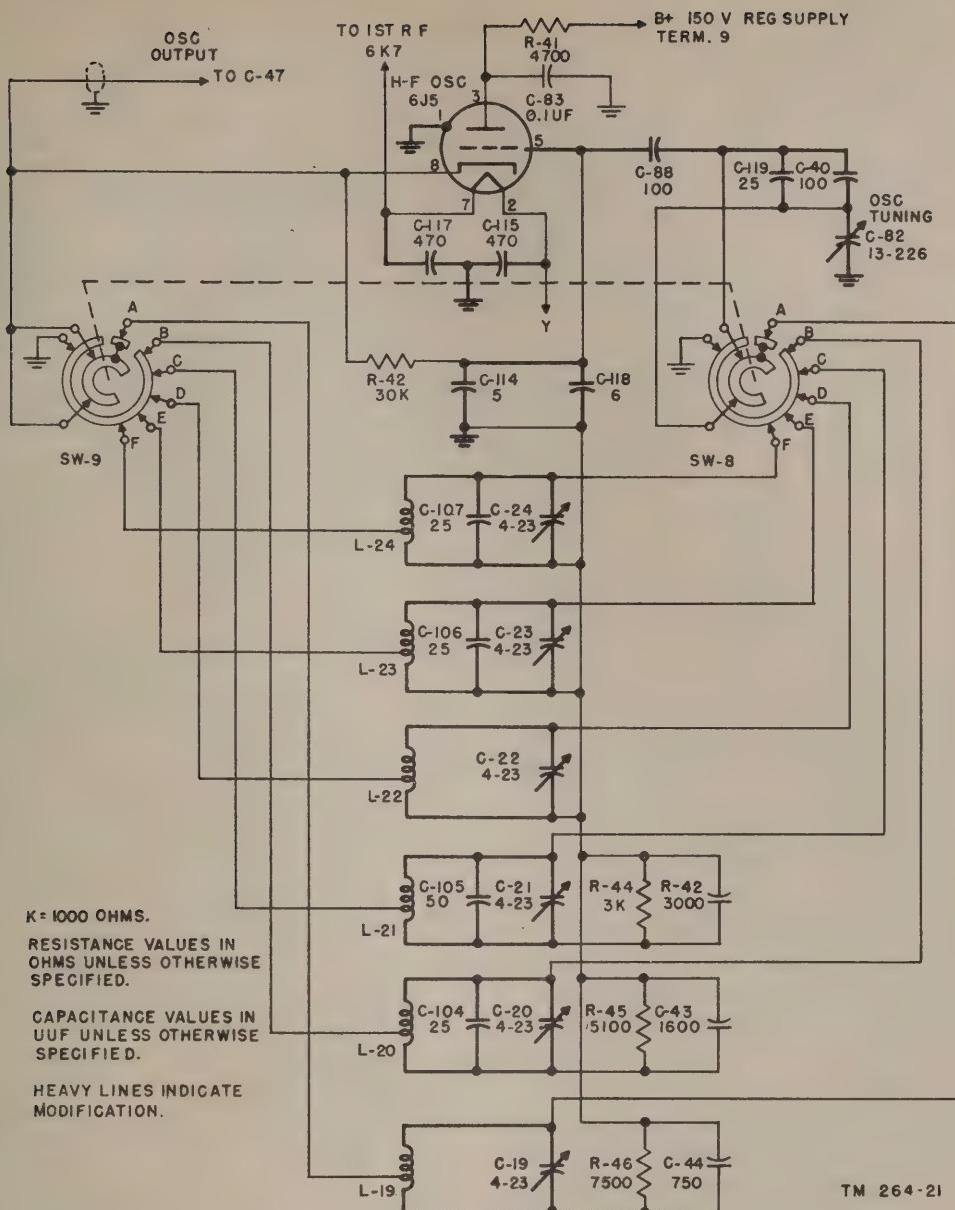


Figure 48. Radio Receiver R-336/GRC-26, h-f oscillator, schematic diagram.

by the addition of 470-uuf capacitors C-115 and C-117. The r-f voltage at the cathode of the oscillator tube is coupled through a special polyethylene-covered conductor and a mica d-c blocking capacitor (C-47) to the injector grid of the mixer tube.

b. MODIFICATION OF MIXER STAGE (fig. 49). D-c blocking capacitor C-47, which couples the oscillator voltage to the injector grid of the mixer tube, a tube type 6L7, has been changed to a mica type of the same value. Injector grid r-f bypass capacitor C-112, having a negative temperature coefficient, has been

added to compensate for variations in the circuit with temperature changes. Screen grid r-f bypass capacitor C-113 has been added for additional filtering action. Screen voltage-dropping resistors R-15 and R-50 have been replaced by R-63 and R-64. Screen grid voltage is now derived from the regulated portion of the power supply.

c I-F AMPLIFIER STAGE. To provide an i-f output connection from the second i-f amplifier stage, the circuit of V-6 (a tube type 6K7) is modified as shown in figure 50. Cathode bypass capacitor C-68 is disconnected, and the i-f

K = 1000 OHMS

RESISTANCE VALUES IN OHMS
UNLESS OTHERWISE SPECIFIED

CAPACITANCE VALUES IN UF
UNLESS OTHERWISE SPECIFIED.

HEAVY LINES INDICATE MODIFICATION.

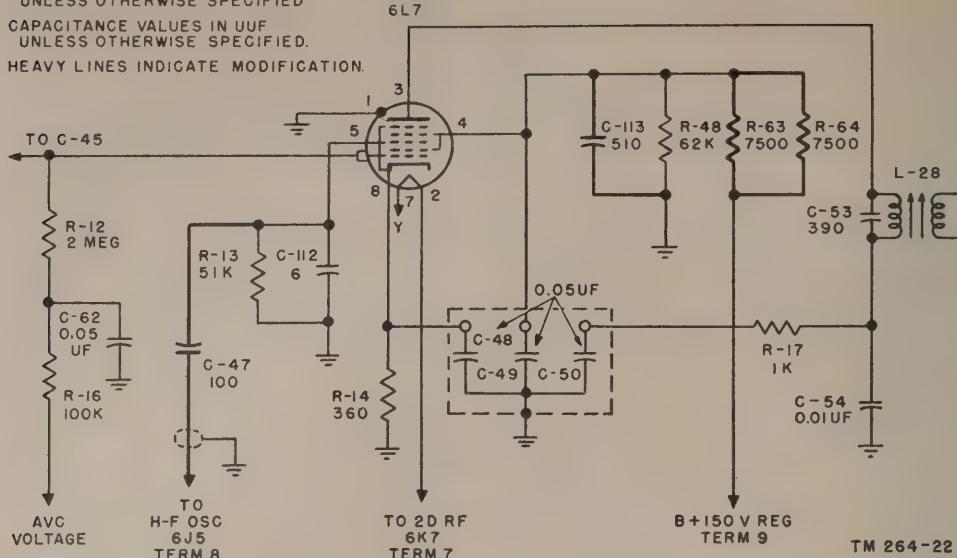


Figure 49. Radio Receiver R-336/GRC-26, mixer stage, schematic diagram.

signal voltage developed across resistor R-24 is applied through a shielded wire and an additional capacitor (C-68A) to coaxial jack J-107 (mounted on the front panel of the receiver). For operation with Radio Set AN/GRC-26, the i-f signal at jack J-107 is fed through RF Cable Assembly CG-562/U to the corresponding (channel A or B) input of Dual Diversity Converter CV-31(*)/TRA-7.

d. B PLUS FUSE. The front panel mounted LAMPS fuse has been replaced by a B PLUS $\frac{1}{8}$ AMP fuse (F-2 in fig. 77) to protect the high-voltage supply.

e. ANTENNA CONNECTION. Signal Corps Socket SO-239 replaces the original SIG. ANT. connector on the receiver front panel, for connection of coaxial receiving antenna lead-in terminated in Signal Corps Plug PL-259-A. Adapter M-359, furnished with the radio set, is used as a right-angle adapted for this connection.

93. Rectifier RA-20-B

(figs. 51 and 66)

Rectifier RA-20-B is a regulated power supply operating on an a-c input of 110-120 volts, 50-60 cycles. The rectifier incorporates a hermetically sealed transformer and choke in a single case which is designed to protect these components when operating in extremely humid climates. Voltage regulator tube V-11 (an

OA2) is included in the rectifier circuit in series with 2,500-ohm resistor R-59 to provide a regulated 150-volt supply for the operation of the h-f oscillator circuit, and to supply screen voltage for the mixer tube. The rectifier tube (V-10) for Rectifier RA-20-B is a tube type 5Y3GT. Figure 66 is a view of the bottom of Rectifier RA-20-B.

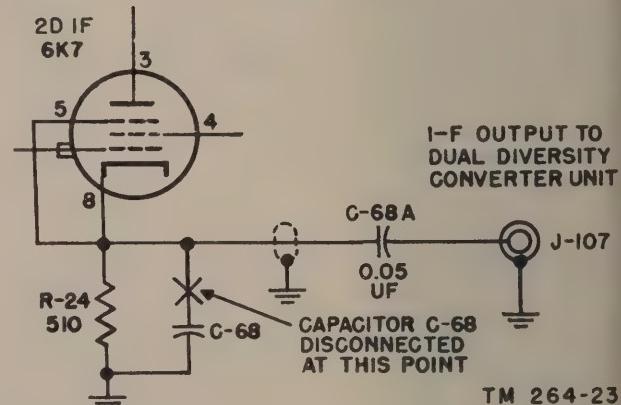


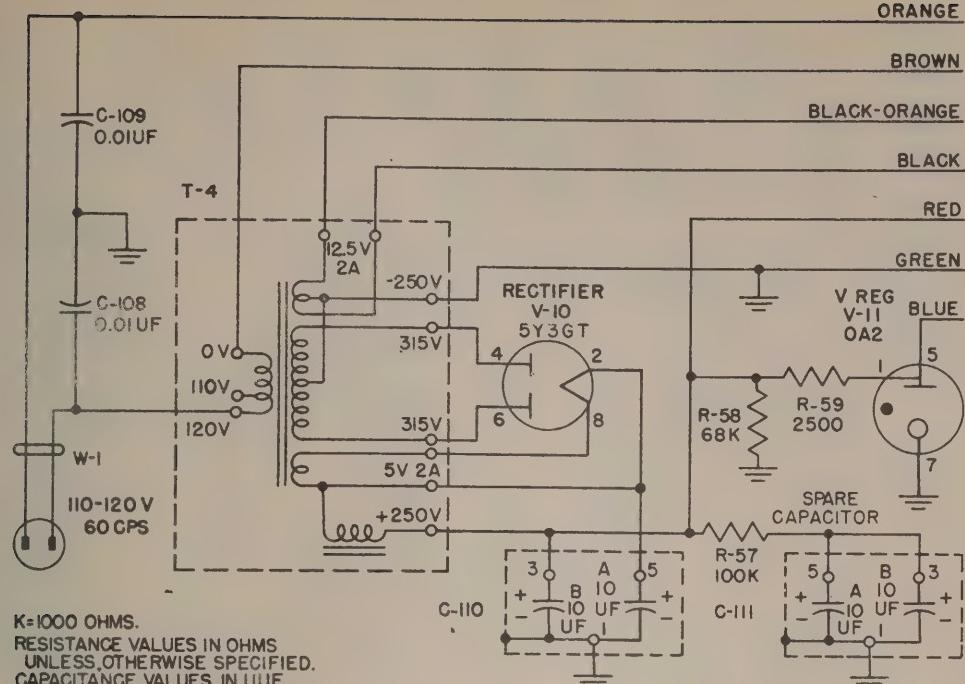
Figure 50. Radio Receiver R-336/GRC-26, i-f amplifier output connection, schematic diagram.

94. Radioteletypewriter Control C-535/GRC-26

(figs. 10, 52, and 53)

a. FUNCTIONS. The radioteletypewriter control performs three major functions:

- (1) It directly connects—



TM 264-24

Figure 51. Rectifier RA-20-B, schematic diagram.

- (a) Polar output of converter to control unit.
- (b) Polar output of control unit to exciter.
- (c) Receiver disabling control line from control unit to converter.
- (d) Transmitter disabling control line from control unit to exciter, and from exciter to Speech Amplifier BC-614-(*)�.
- (2) It provides jacks for—
 - (a) Frequency-shift keying.
 - (b) C-w keying.
 - (c) Picking up neutral teletypewriter signal output from converter.
- (3) It switches connections between the control unit and the teletypewriter equipment (the two teletypewriters and the perforator-transmitter) so that—
 - (a) Either TT can be used to send messages.
 - (b) Either or both TT's can be used to receive messages.
 - (c) Left TT can be used to send while right TT is used to receive (only on full-duplex operation).
 - (d) Right TT can be used to send while

left TT is used to receive (only on full-duplex operation).

- (e) Perforator can be connected to sending TT and used to send. Simultaneously, local punched and printed tape copy and page copy of the transmitted message will be made.
- (f) Perforator can be connected to receiving TT and will make punched and printed tape copy of received message while receiving TT is making page copy.
- (g) Transmitter-distributor is connected so that message can be sent from prepared tape, irrespective of position of switches on teletypewriter control.

b. SWITCH OPERATION.

- (1) Any sending or receiving teletypewriter equipment must be connected to jack J-5 (fig. 52) so that—
 - (a) Red plug of receiving equipment is connected between D and E (or between D and ground for extension operation).
 - (b) Red plug of sending equipment is connected between A and B.

ROTARY SWITCHES ARE VIEWED FROM END
OPPOSITE CONTROL KNOB.
SWITCH SECTIONS DESIGNATED (1) ARE CLOSEST
TO THE KNOB END.

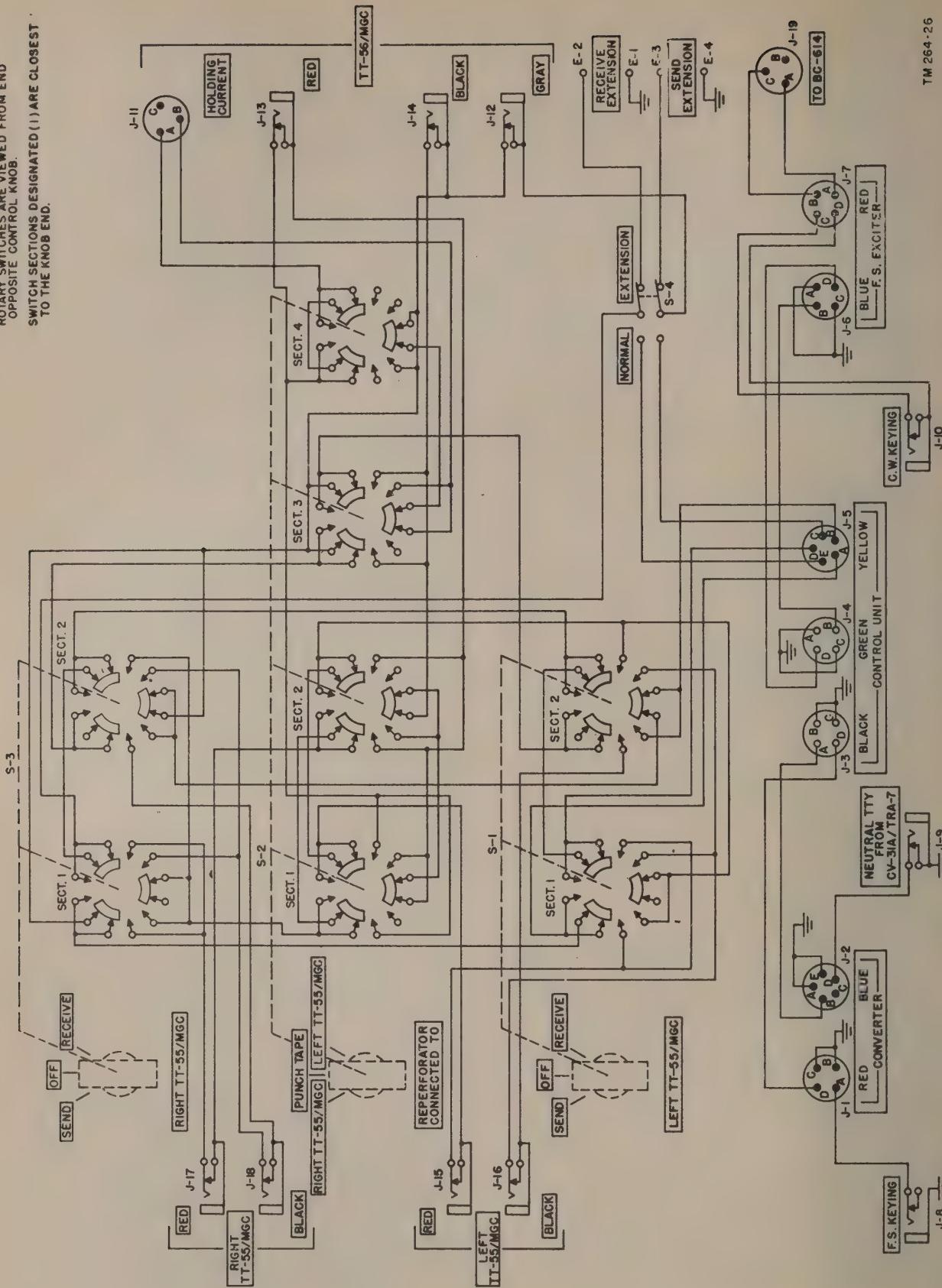
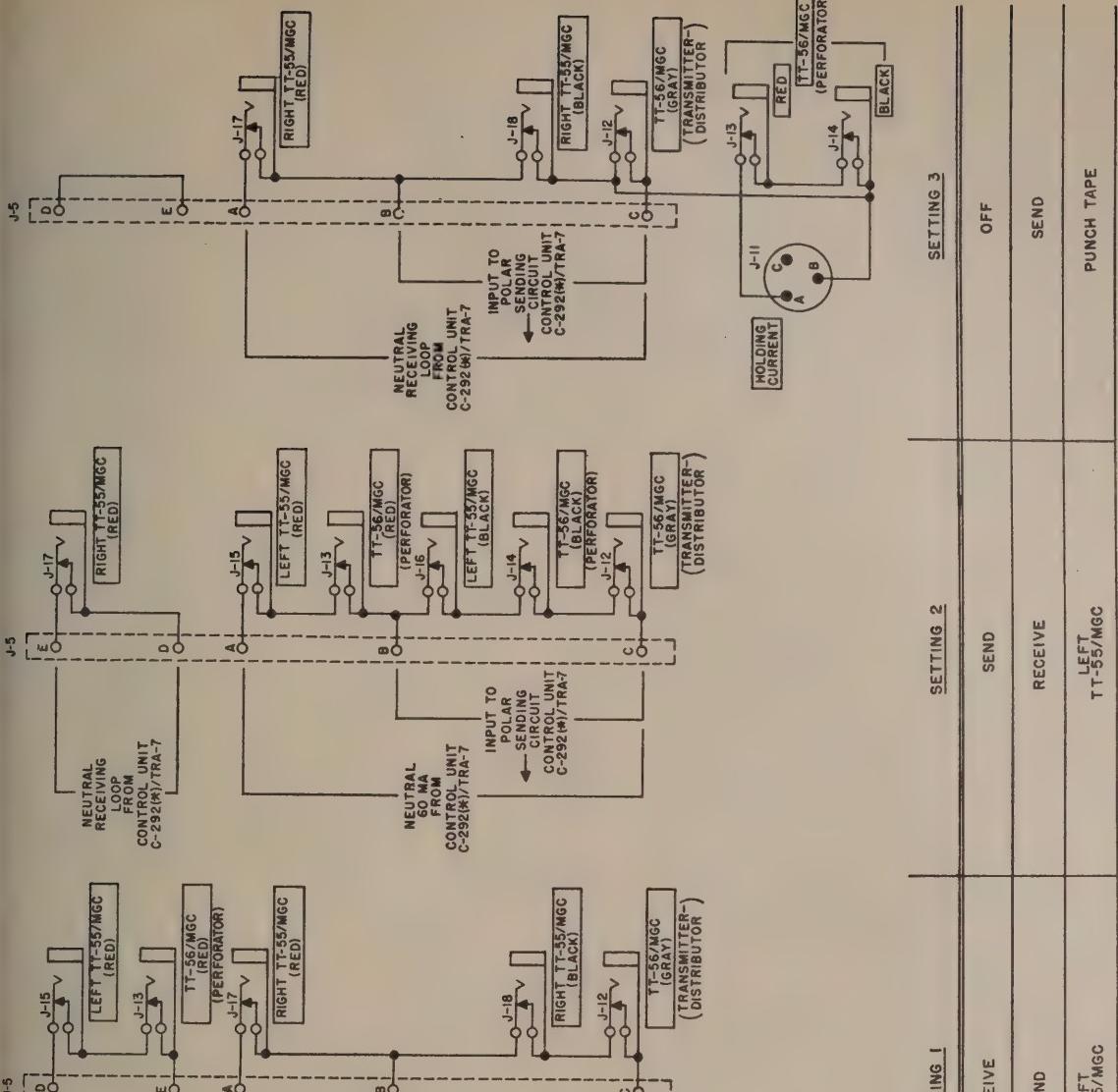


Figure 52. Radioteletype writer Control C-535/GRC-26, schematic diagram.

- FOR FULL DX OPERATION, ONE TELETYPEWRITER TT-55/MGC IS USED FOR THE RECEIVE CIRCUIT AND ONE FOR THE SEND CIRCUIT. SETTINGS 1 & 2 ILLUSTRATE SWITCH POSITIONS OF THE RADIO TELETYPEWRITER CONTROL CORRESPONDING TO FULL DX OPERATION.
- FOR HALF DX AND ONE WAY REVERSIBLE OPERATION, ONE TELETYPEWRITER TT-55/C IS USED FOR BOTH THE SEND AND RECEIVE CIRCUITS. SETTING 3 ILLUSTRATES SWITCH POSITIONS OF RADIO TELETYPEWRITER CONTROL CORRESPONDING TO HALF DX OPERATION. NOTE THAT THE SWITCH FOR THE TELETYPEWRITER IN USE IS OPERATED TO SEND.
- THE PERFORATOR MAY BE CONNECTED TO THE SEND OR RECEIVE TELETYPEWRITERS OR MAY BE CONNECTED TO PUNCH TAPE.
- SETTING 1 ILLUSTRATES CONNECTIONS FOR THE PERFORATOR CONNECTED TO "RECEIVE" TELETYPEWRITER.
- SETTING 2 ILLUSTRATES CONNECTIONS FOR THE PERFORATOR CONNECTED TO "SEND" TELETYPEWRITER.
- SETTING 3 ILLUSTRATES CONNECTIONS FOR THE PERFORATOR CONNECTED TO "PUNCH TAPE". HOLDING CURRENT IS SUPPLIED BY RECTIFIER RA-87.
- THE TRANSMITTER-DISTRIBUTOR IS ALWAYS CONNECTED TO SEND.



SWITCH DESIGNATION	SETTING 1	SETTING 2	SETTING 3
LEFT TT-55/MGC	RECEIVE	OFF	OFF
RIGHT TT-55/MGC	SEND	SEND	SEND
REPERFORATOR CONNECTED TO	LEFT TT-55/MGC	LEFT TT-55/MGC	PUNCH TAPE

Figure 53. Radioteletypewriter Control C 535/CRC-26, simplified schematic diagram.

- (c) Black plug of sending equipment (and gray plug of transmitter-distributor) is connected between B and C (or between B and ground for extension operation).
- (2) Figure 53 is a simplified schematic of the teletypewriter control for the three common switch positions.
- (a) This figure shows that when either TT is switched to SEND, the red plug is connected between A and B of jack J-5 and the black plug is connected between B and C.
- (b) Settings 1 and 2 show that when either TT is switched to receive, the red plug is connected between D and E.
- (c) In setting 3, a holding current is shown applied across the perforator. This prevents the perforator from running open.
- (d) Setting 1 shows that the perforator is connected to the receiving TT by operating the REPERFORATOR CONNECTED TO switch to the receiving TT. The perforator red plug is connected in series with the receiving TT red plug, between D and E. With switches in this position, the perforator will print tape copy while the receiving TT prints page copy.
- (e) Setting 2 shows the perforator connected to the sending TT by operating the REPERFORATOR CONNECTED TO switch to the sending TT. The perforator red plug is connected in series with the sending TT red plug and perforator black plug is connected in series with the sending TT black plug. Messages can be sent manually from the sending TT keyboard or from the perforator keyboard, as desired. Local page and tape copy of transmitted message will be made.
- (f) Settings 1 to 3 show that the transmitter-distributor gray plug is always connected between B and C of jack J-5 no matter how the switches of teletypewriter control are set. The transmitter-distributor can send from prepared tape with

any switch setting on the teletype-writer control.

95. Control Box C-345A/MRC-2 (fig. 54)

Control Box C-345A/MRC-2 is a volume control box for the a-f (audio-frequency) output of two Radio Receivers R-336/GRC-26. The channel A receiver audio output is fed by plug P-1 through potentiometer R-1 to jack J-1 for headphones, or to jack J-3 for a loud-speaker. This sequence of operation is the same for the channel B receiver using plug P-2, potentiometer R-2, and jacks J-2 and J-4.

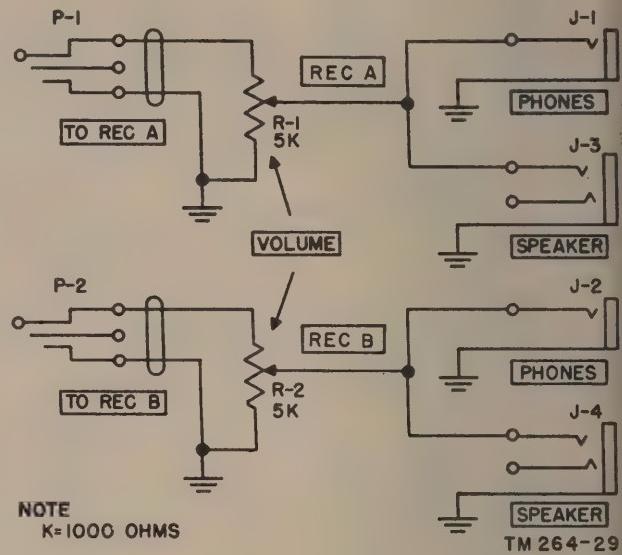


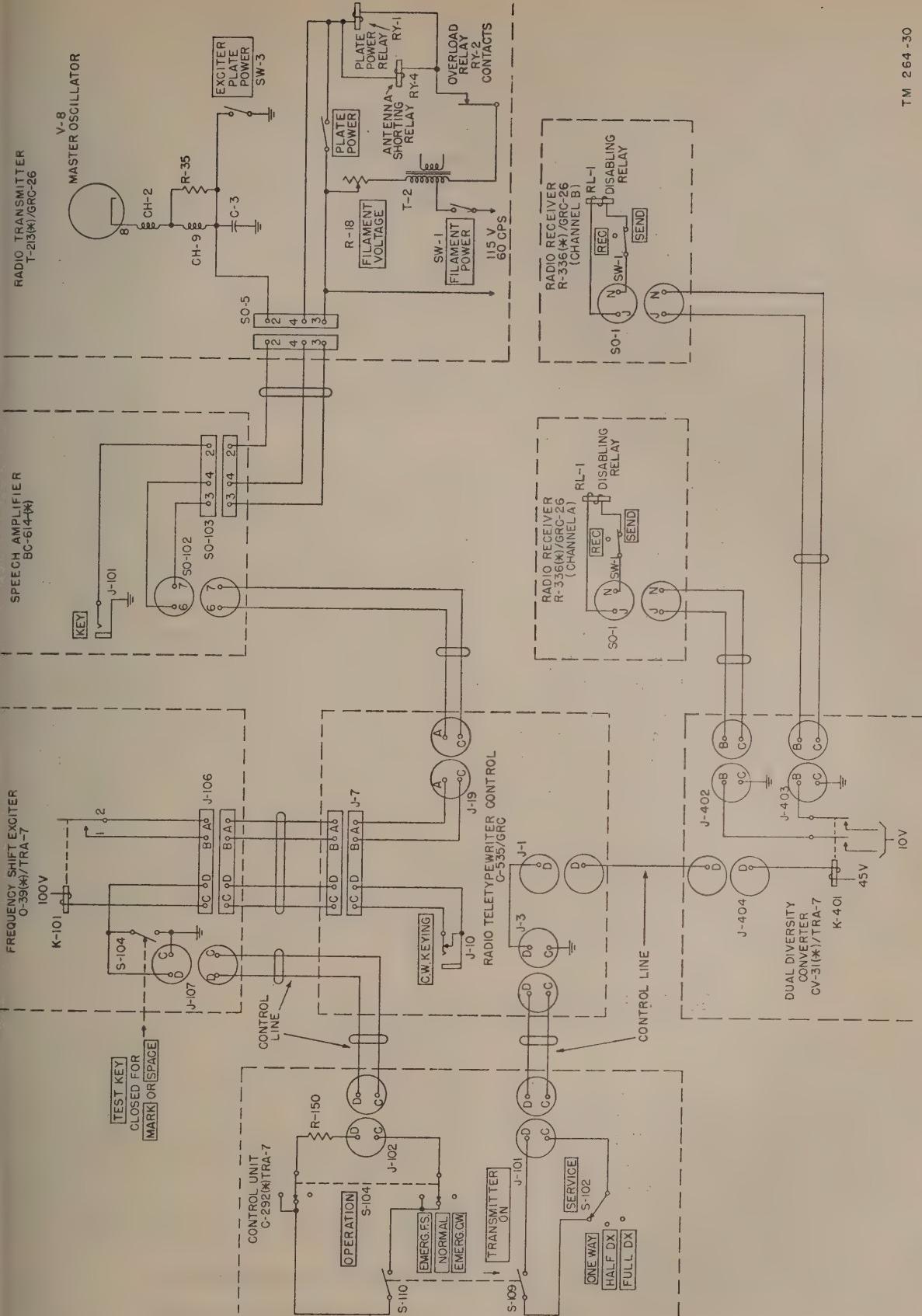
Figure 54. Control Box C-345A/MRC-2, schematic diagram.

96. System Functioning

Figure 75 is a complete block diagram of Radio Set AN/GRC-26 showing over-all functions of receiving and transmitting components.

a. RECEIVING CIRCUIT. Radio signals are picked up by the receiving antenna and fed into Radio Receiver R-336/GRC-26. For diversity operation, both receivers are used, connected to separate receiving antennas spaced at least three wavelengths apart. The input signal contains frequency-shift teletypewriter signals, and may or may not be amplitude-modulated by an audio signal. In either case, the receivers amplify the signal, convert it to an i.f., and then further amplify it. The i.f. for mark signals is 470 kc -425 cycles on re-

Figure 55. Radio Set AN/GRC-26, functional diagram, receiver and transmitter disabling.



ceiver bands A, B, and C, and 470 kc +425 cycles on receiver bands D, E, and F. The i-f. is fed into the last stages of the receivers and into Dual Diversity Converter CV-31(*)/TRA-7, simultaneously. The simple diode detector of the receiver does not respond to a small frequency-shift signal when the receiver is properly tuned. Thus, any a-m signal is detected and fed into the receiver loudspeakers as if the frequency-shift signals were not present. The converter picks the better signal from the two i-f signals fed into it (if diversity reception is used), removes all a-m in the common limiter, and, from the frequency-shift teletypewriter signal, obtains a polar d-c signal. This is sent through Radio teletypewriter Control C-535/GRC-26 to Control Unit C-292(*)/TRA-7. Here it is converted to a neutral signal and is sent to the radioteletypewriter control and from there to receiving Teletypewriter TT-55/MGC where the received message is printed in the form of page copy. If desired, the neutral signals may be fed simultaneously to Perforator-Transmitter TT-56/MGC for automatic punching and printing of the received message on paper tape.

b. TRANSMITTING CIRCUIT. A message typed on sending Teletypewriter TT-55/MGC is transmitted in the form of neutral d-c telegraph signals through Radioteletypewriter Control C-535/GRC-26 to Control Unit C-292(*)/TRA-7. The control unit changes these signals to polar signals, and they are then fed through the teletypewriter control into Frequency Shift Exciter O-39(*)/TRA-7. The signal is emitted from the exciter in the form of frequency-shifted r-f signals which are multiplied to the desired output frequency and amplified in

Radio Transmitter T-213/GRC-26. R-f signals from the transmitter are of operating carrier frequency +425 cycles for mark signals and carrier frequency -425 cycles for space signals. These signals are then fed to the transmitting antenna by means of the 75-foot transmission line for the doublet antenna, or through RF Cable Assembly CG-558/U and Antenna Tuning Unit BC-939-(*) for the vertical whip antenna. Automatic transmission of a pre-punched tape by means of the transmitter-distributor may be substituted for manual sending from the send teletypewriter. Circuit sequence is the same as noted above.

97. Disabling and Enabling of Transmitter and Receivers

Figure 55 shows circuits which disable and enable the transmitter and receivers. The receivers may be disabled only when one-way service is used and the receiver SEND-REC switch is in the SEND position. The transmitter is enabled whenever coils of antenna shorting relay RY-4 and plate power relay RY-1 are energized and the cathode of master oscillator tube V-8 is grounded. The cathode of V-8 may be grounded by operating the EXCITER PLATE POWER switch to the ON (up) position, or by keying through jack J-101 of the speech amplifier. The coils of relays RY-1 and RY-4 may be energized by operating the PLATE POWER switch to the ON (up) position by operating the control unit TRANSMITTER switch to ON (in normal and emergency frequency shift operation) or by operating the exciter TEST KEY to either the MARK or the SPACE position.

Section II. ANTENNA SYSTEM THEORY

98. General

The primary purpose of a radio station is to provide dependable communication. One of the chief concerns of the radio transmitting portion of the station is the placing of a signal of usable strength at the point of reception. Any radiation that goes elsewhere can be regarded as wasted, and in military service is likely to interfere with other radio services and be picked up by enemy listening posts. Thus the requirement of a good transmitting antenna

is that of high directivity in the desired direction with a minimum of radiation in other directions. A good receiving antenna should also have high gain in the desired direction so that the necessary signal need not be as powerful, and a minimum of radiation should be received from unwanted directions as this unwanted reception can be considered as noise.

99. Frequency Considerations

There are two principal paths for radiated

waves from a transmitter to a receiver; the ground wave and the sky wave. The ground wave follows a relatively low path along the ground to reach the receiver and is useful only for short distance signal communications, due to the high attenuation caused by ground absorption. For longer distance signal communication, the sky wave is utilized. This propagation path is founded on the principle that certain layers in the atmosphere, called the ionosphere, will reflect a radio wave and cause it to be returned to the earth. While ground wave signal communication is relatively constant, the conditions affecting the reflection of the sky wave are subject to sudden and periodic changes. The ionosphere is made up of a number of layers ranging from 60 to 200 miles above the earth.

a. The spherical layers of the ionosphere are layers of ions of the atmosphere, formed by ultraviolet radiation from the sun. These, in order of their distance from earth, are E and F (which is made up of the F₁ and F₂ layers) (fig. 56).

b. Each layer represents a certain percentage of ionization of the atmosphere molecules and consequently has different electrical properties. The outermost layers, those of lowest molecular density, absorb the most ultraviolet radiation, become most highly ionized, and consequently have the greatest electrical effect

upon the radio wave. Since the degree of ionization depends on the intensity of the sun's rays, it is expected that the layers will vary in height and intensity during the day, as well as seasonally. The E layer appears only during daylight hours. This is because the greatest possible intensity of ultraviolet radiation from the sun is required to penetrate the earth's atmosphere deeply enough to form it. During the day the F layer separates into the F₁ and F₂ layers. The F, F₁, and F₂ layers are of greatest importance to long distance radio communications. For further information, see TM 11-314 and TM 11-499.

c. The bending of a radio wave in an ionized layer is a function of the frequency of the wave as well as the density of the ionized layer. The layers have a higher index of refraction for low frequencies; that is, lower frequencies will be refracted more than higher frequencies. This fact is of importance in deciding whether a particular frequency will be usable between two points. For a given distance there will be an approximate maximum frequency at which the sky wave will be refracted back to earth. The MUF (maximum usable frequency) is the highest frequency which a single refraction by the ionosphere will return to earth at the point of reception. It may be seen that the MUF is determined by the condition of the ionosphere at the point of refraction, or control point, of the radio wave. Charts published monthly by

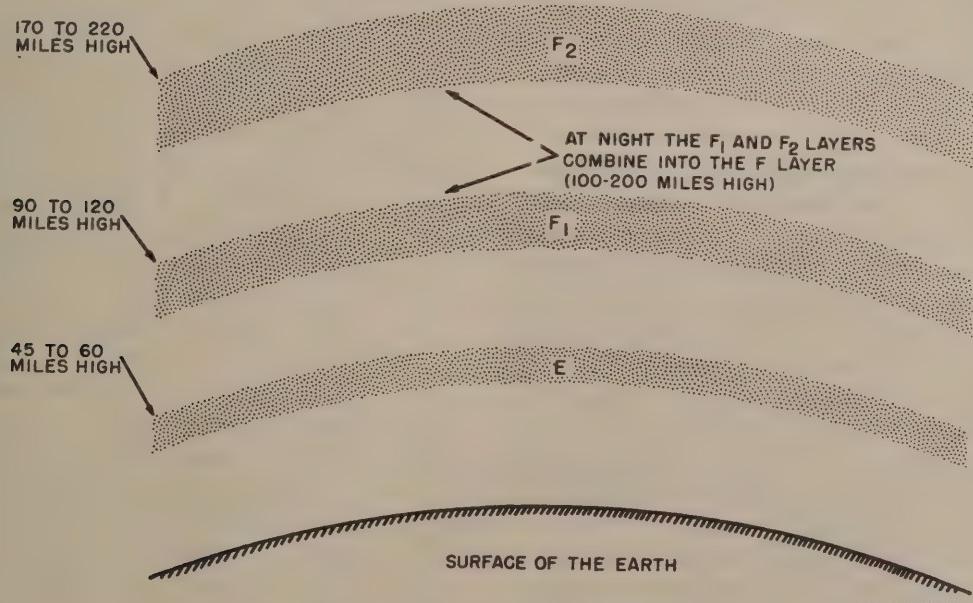


Figure 56. Location of ionospheric layers.

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the Interservice Radio Propagation Laboratory, National Bureau of Standards, Washington, D. C., are used to determine the MUF in accordance with the time and transmission path. These are issued as TB 11-499-().

100. Diversity Reception

Diversity reception is a method which is widely used in communication set-ups. It is a system designed to overcome the effects of fading of radio signals. Short period variations (fading), usually 1 second or less in duration, in the signal delivered by the receiving antenna will not have a great effect upon low-speed telegraph traffic, but in the case of high-speed telegraphy and teletypewriter, even short variations will have a marked effect upon the accuracy of a message.

a. **TYPES OF FADING.** Fading may be conveniently divided into two types—single-path and multi-path. Single-path fading is considered from the viewpoint of variations on only one wave of radiation of the many making up the received signal. In multi-path fading, the mutual effects of two or more waves that are components of the received signal, traveling over different path lengths, are considered. Both types of fading may, and usually do, exist simultaneously.

- (1) **Single-path fading.** Consider the case of an antenna oriented in such a way that the signal leaving the transmitting antenna will arrive, after reflection from the ionosphere, with maximum signal strength. If a shift in the height of the ionosphere occurs, the transmitted wave will arrive at a different point on the earth's surface. Consequently, a weaker signal will be received. If a great change occurs, it is possible that the complete radiation will skip over or fall short of the receiving point. These conditions cause *strength fading*. They are likely to consist of slow variations. Since the intensity of the carrier and the side bands will be decreased simultaneously and in the same proportion, no distortion will exist.
- (2) **Multi-path fading.** Multi-path fading is the result of a transmitted signal arriving at the receiving point from

a number of directions and out of phase. This condition is set up by scattering of the signal by the ionosphere, or the combination of the sky and ground waves at the receiving point. The waves may leave the ionosphere from varying points and at changing angles. What was a point of weak reception one moment may pick up a good signal the next moment. This condition is called interference fading, and is caused by multi-path transmission. This type of fading is more rapid, and the range of the fading is greater than that in single-path transmission. In addition, multi-path transmission is very sensitive to frequency. A slight change in the output frequency of the transmitter will change the length of the relative paths by an appreciable fraction of a wavelength.

b. **REDUCING EFFECTS OF FADING.** The most practical methods developed to date to reduce the effects of fading are agc (automatic gain control) or avc (automatic volume control), frequency diversity, space diversity, and polarization diversity.

- (1) **Automatic gain control.** This system is the same as the familiar avc circuits. The main disadvantage of such a system is that it will only bring all signals received down to a constant level. It cannot strengthen a weak signal. It is for this reason that the OFF-M.V.C.-A.V.C. controls on the radio receivers of Radio Set AN/GRC-26 are kept in the M.V.C. position. If an agc system is designed to act rapidly, it may actually remove the lower modulation frequencies from the received signal. With the agc switched out of the system, the original keyed waveshape is maintained.
- (2) **Frequency diversity.** A frequency diversity system takes advantage of the fact that fading of slightly different frequencies at one receiving point will not be the same. To accomplish this, the carrier is modulated with an audio signal of approximately 500 cycles, which results in the radiation of a carrier and upper and lower

side-band frequencies. The receiver bandwidth is such that it will pass all these frequencies, so that fading at one of the frequencies can be tolerated without a complete loss of signal strength. This system is not applicable to Radio Set AN/GRC-26.

- (3) *Space diversity.* A space diversity system makes use of the diversity of fading existing at receiving antennas, spaced a number of wavelengths apart. It is based on the fact that instantaneous fading does not occur everywhere at one time. The several positions chosen will fade alternately so that a relatively strong signal always will be received at some position. This system has been widely adopted and is the one that is used in Radio Set AN/GRC-26. Any space diversity system consists of three major components—

- (a) Two or more independent antennas.
 - (b) Two or more receivers, one for each antenna.
 - (c) A diversity combining unit to combine the outputs of the receivers. In addition, there may be other special circuits, dependent on the type of operation (radiotelegraphy, radioteletype, etc.).
- (4) *Polarization diversity.* A wave may leave the transmitting antenna with a certain polarization, but it may arrive at the receiving antenna with a polarization varying from the horizontal to the vertical angles. To overcome this, antennas may be placed in the vertical and horizontal positions at the receiving point. The received signal improvement, however, is less than that experienced with the space diversity system.

101. Half-wave Antenna

a. LENGTH OF RESONANT WIRE. The shortest length of wire which will resonate to a given frequency is one which is just long enough to permit an electric charge to travel from one end to the other and back again in the time of 1 r-f cycle. If the speed at which the charge travels is equal to the velocity of light, or 300,000,000 meters per second, the distance which

it will travel in 1 cycle will be equal to this velocity divided by the frequency in cps, or $= \frac{300,000,000}{f}$ in which λ is the wavelength in meters. Since the charge traverses the wire twice, the length of the wire needed to permit the charge to travel a distance λ in 1 cycle is $\lambda/2$, or 1 half-wavelength. Therefore, the shortest resonant wire will be 1 half-wavelength long.

b. HARMONIC OPERATION. If there is reflection from the end of a wire, the number of current maxima (loops) on the wire will be equal to the length of the wire divided by its half-wavelength. If the wire is 2 half-waves long there will be two current loops; if 3 half-waves long, three loops, and so on. Therefore, these longer wires, each multiples of a half-wavelength, also will be resonant to the same frequency as the single half-wave wire. When an antenna is two or more half-waves in length at the operating frequency, it is said to be harmonically resonant, or to operate at a harmonic, the number of the harmonics being the number of standing waves on the wire. A wire two half-waves long is said to be operating on the second harmonic.

c. CALCULATION OF ANTENNA LENGTH. The current at the ends of the antenna does not quite reach zero because of the end effect, as there is some current flowing into the end capacity. The electrostatic capacity at the end of a half-wave antenna is higher than might be expected, because of the presence of the insulators which support the antenna. For ordinary purposes, this end effect causes the physical length of the antenna to be about 5 percent less than the length of a half-wave in space. The length of a half-wave antenna may be taken to be λ (feet) equals $468/f$ (mc). This formula is sufficiently accurate for finding the physical length of a half-wave antenna.

d. ANTENNA RESISTANCE. The energy supplied to an antenna is dissipated in the form of radio waves and in heat losses in the wire and nearby objects. Radiation resistance is that value of resistance which would dissipate the same power as disappears by radiation. Radiation resistance is measured at a current maximum or loop on the antenna. For a half-wave antenna in space, the radiation resistance is equal to approximately 73 ohms. This value varies somewhat, depending on the proximity

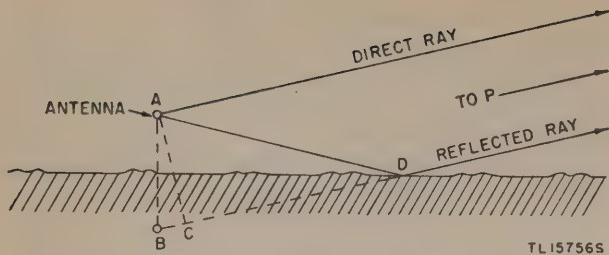


Figure 57. Ground reflection of radio waves leaving transmitting antenna.

of the antenna to surrounding objects and the height above ground. Since the actual ohmic resistance of the antenna wire is small at high frequencies compared to the radiation resistance, most of the energy dissipated in a half-wave antenna is by radiation. A half-wave antenna is generally a very efficient radiator.

e. GROUND EFFECTS. The earth acts as a reflector for those waves which are radiated from the antenna at angles lower than the horizontal (fig. 57). A radiated wave (A) that strikes the ground (D) at an angle of 15° is reflected upward from the surface of the ground at the same angle. The ground may also absorb a portion of the radiated energy. The reflected wave may combine with the direct waves to reinforce or partially cancel the direct or sky waves, depending on the position of the antenna with respect to earth, the height of the antenna, its length, and the condition of the ground (whether it is dry or wet). If the reflected and direct waves arrive (at P) or combine nearly in phase, there will be a reinforcement of the sky wave, and if they arrive out of phase, there will be partial cancellation of power and a decrease in the intensity of radiation.

f. FEED SYSTEM. The function of any feeder system for an antenna is to transport power from the transmitter to the antenna with a minimum loss. If a line were infinitely long, a current started down it would eventually dissipate because of the resistance of the line, with the result that there would be no reflection of the current at the end and, consequently, no standing waves. Every type of line has a characteristic impedance which depends on the size and spacing of the conductors. If a line is cut to a definite length, and a resistance equal to the characteristic impedance is used

to replace the length of line that would have made the line of infinite length, there will be no reflection at the end of the wire and no standing waves. If the end of this feeder line could be connected to a point on the half-wave antenna which had an impedance equal to the characteristic impedance of the feeder line, the feeder would be matched to the antenna, and maximum power transfer would occur. When mismatching occurs, the feeder also becomes a radiator with consequent power loss. The radiated wave leaving the feeder may partially cancel the radiated wave from the antenna. The presence of hot spots along a feeder line are an indication of a resonant or mismatched feeder line.

g. RADIATION PATTERNS (figs. 58 and 59). The pattern of the half-wave antenna in space is modified when the antenna is brought within proximity of the ground, as stated in *e* above. The radiation angle of any antenna is stated in terms of degrees, and it is that angle, with respect to ground, at which the radiated waves are most intense. It would be a difficult job to predict the exact angle of radiation (the directivity) of a half-wave antenna at any particular location without actually field-testing the antenna and feeder set-up. However, it is possible to get an approximate idea of results to be expected for work over long distances. The radiated patterns of a half-wave antenna operating on its fundamental and sixth harmonic frequencies at a radiation angle of 15° (representing an angle for long distance coverage for 28, 14, and 7 mc) are shown in figure 58. The patterns shown should be interpreted merely as an indication of the results to be expected. As can be seen by figure 58, operating an antenna at its harmonic frequencies changes the characteristics of its radiated pattern. In the case of a doublet antenna (half-wave) with a fundamental operating frequency of 2,500 kc, the same antenna becomes $1\frac{1}{2}$ wavelengths in length at the third harmonic and $2\frac{1}{2}$ wavelengths in length at the fifth harmonic. When the wire is a wavelength or more long, the radiation tends to concentrate more off the ends of the wire and radiates more power in its most favorable directions than a half-wave antenna in its favorable directions. The free space patterns of long-wire antennas are shown in figure 59.

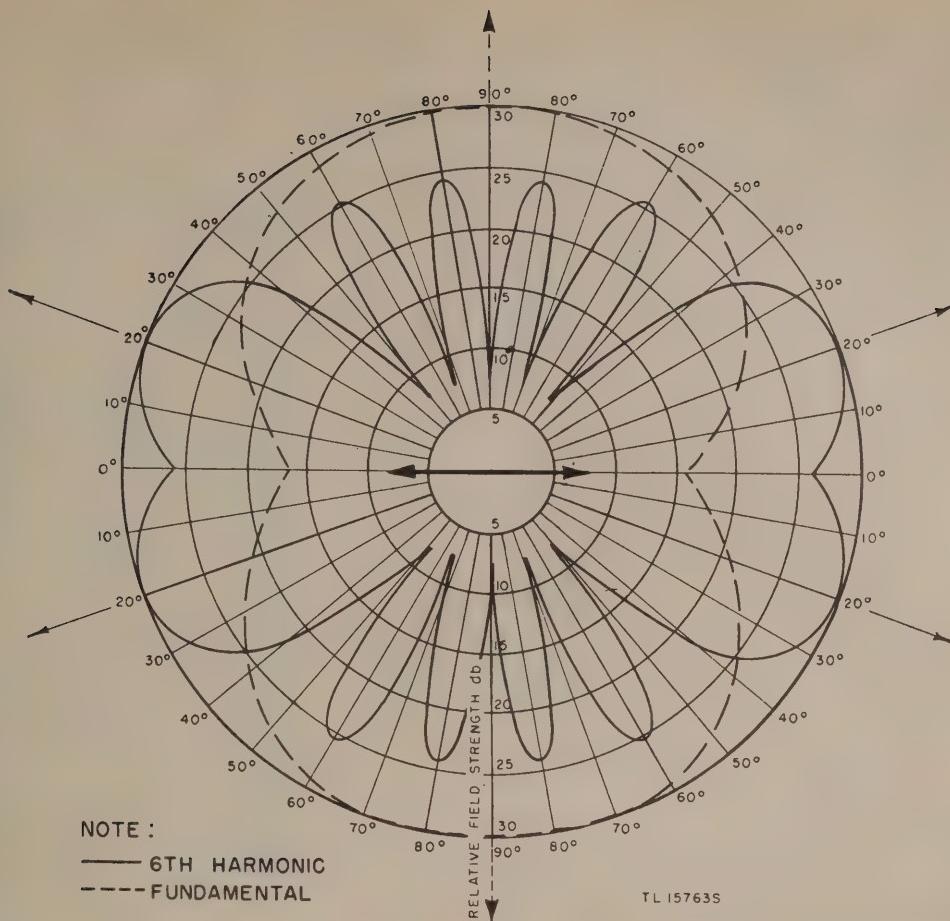


Figure 58. Radiation patterns of half-wave antenna on fundamental and sixth harmonic at radiation angle of 15°.

102. Transmitting Antenna

The transmitting antenna of Radio Set AN/GRC-26 is, fundamentally, a half-wave antenna designed for harmonic operation on the third and fifth harmonics and the fundamental frequency. It is a double type antenna consisting of two quarter-wave legs which are terminated at the center by a special coaxial cable connector. Current is fed to that point by coaxial RF Cable Assembly CG-557/U (75-ft.). The antenna wire is broken up into sections; each section is connected to the other by insulators.

The antenna wire can be made to have several fundamental resonant frequencies by placing jumper wires around the insulators. At the fundamental operating frequencies, the field pattern of the transmitter signal is sufficiently broad so as to enable operation of the transmitter in nets. At odd harmonic operating frequencies, the field pattern takes the shape of elongated lobes pointing almost toward the ends of the antenna wire, producing a more directive signal and concentration of the r-f radiation. The transmission line for the an-

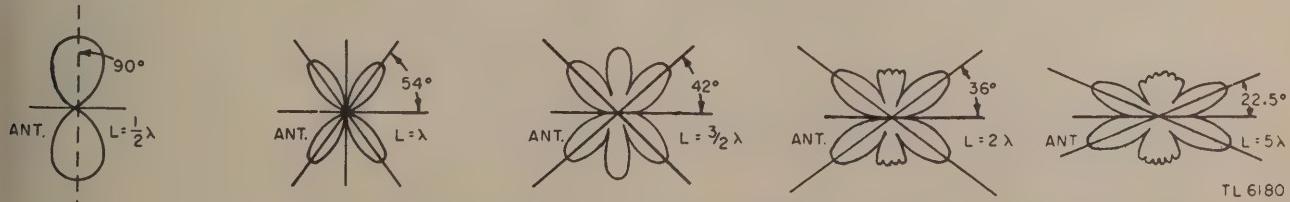


Figure 59. Free space patterns of long-wire antennas.

tenna is an impedance-matched untuned line using a 70-ohm concentric cable. Coaxial RF Cable Assembly CG-557/U consists of a stranded conductor, insulated from the surrounding braided-copper concentric sheath by polyethylene. The entire cable is protected from moisture by a heavy rubber covering. The efficiency of this coaxial cable is high, and if the half-wave doublet has been accurately cut to the desired frequency of operation, maximum possible radiation should occur.

103. Receiving Antennas

Two doublet antennas, spaced a minimum of 3 wavelengths apart (or a maximum of 1,000 feet), are used to supply the signal voltages to the two receivers in Radio Set AN/GRC-26 for diversity reception (fig. 27). The antenna construction is similar to that used in the transmitting antenna set-up (par. 34). RF Cable Assembly CG-557/U is used for the signal feed

line between the antennas and the shelter; since both lead-ins are 500 feet in length, this sets the 1,000-foot limit for antenna separation. If possible, a frequency mode of operation that will not have a radiation lobe across the local transmitting antenna should be selected. Receiving antennas have exactly the same directional patterns as transmitting antennas.

104. Whip Antennas

Whip antennas receive (or transmit) equally well in all directions; that is, they have a 360° field pattern. The distance over which satisfactory communications can be carried with whip antennas is shorter than with half-wave type antennas. Whip antennas are also comparatively noisier, as all the local noise has an effect on the total antenna pick-up. Extreme noise pick-up may be due to an unshielded vehicle or power unit in the immediate vicinity.

Section III. THEORY OF TELETYPEWRITER COMPONENTS

105. Teletypewriter Theory

a. GENERAL. Radio Set AN/GRC-26 consists of a number of both *wire* and *radio* equipments working as a unit and consequently involving practices and theory of both. Figure 75 is a block diagram of Radio Set AN/GRC-26. Telegraph printers (teletypewriters) are available that will operate normally over 10 to 20 miles of unloaded field Wire W-110-A or W-110-B without repeaters or line relays, depending on whether battery (current) is supplied at one or both ends of the line.

b. TELETYPEWRITER CODE. A special teletypewriter code (fig. 60) is used in which each letter or signal is made up of five units or elements of equal length. These elements are known as marking or spacing impulses.

- (1) *Marking impulses.* Marking impulses are those signals which operate the selector magnets in the receiving printer.
- (2) *Spacing impulses.* Spacing impulses, or signals, are of the same length (duration) as the marking impulses, but do not operate the selector magnets of the receiving printer.
- (3) *Other impulses.* Provision is made to

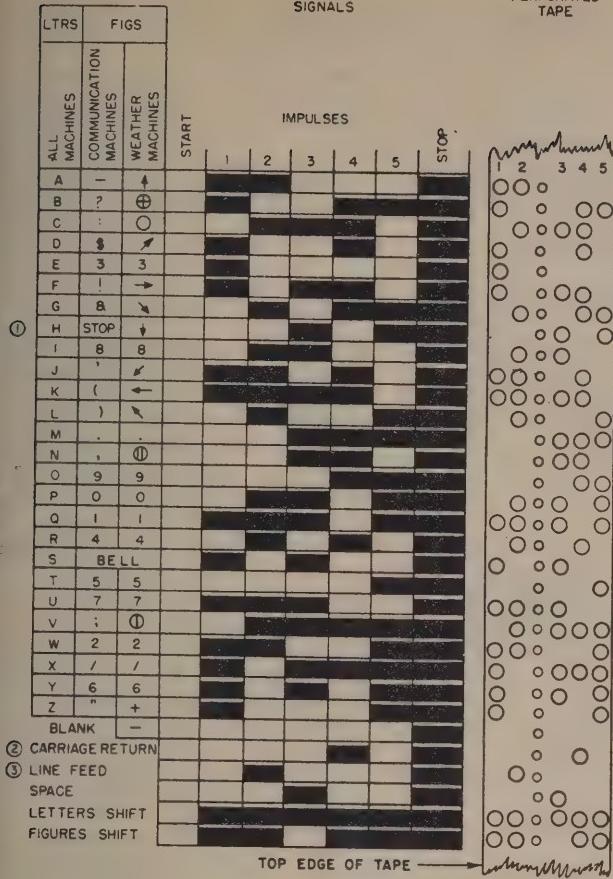
set the machine in readiness for receiving the code group by a spacing impulse (start), which precedes the code group. Another impulse (marking) follows the last impulse of the code group and is used to return the machine to a position of readiness to receive the next code group. This impulse is 1.42 times as long as the other impulses (fig. 60) and is called the stop impulse because it stops the receiving machine in order to maintain synchronism with the sending machine.

c. OPERATING CURRENT. The mark and space impulses used to operate a teletypewriter are pulses of direct current of uniform intensity (fig. 60). If oscilloscope test prods were connected across a line carrying these mark and space impulses, they would appear as a square waveform (fig. 61). It is highly important that the transmitter impulse maintain its waveform when it reaches the receiving apparatus, as a steady impulse is necessary for correct operation of the receiving machine. When sending at 60 wpm (words per minute), assuming a standard 5-letter word, the time for each unit signal impulse is 22 ms (milliseconds).

PLATEN POSITION

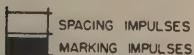
LINE SIGNALS

PERFORATED TAPE



SIGNAL LENGTHS IN MILLISECONDS. STANDARD SPEED 60 WORDS PER MIN

→ 22 + 22 + 22 + 22 + 22 + 22 + 31 →



- ① FIGS BLANK H FOR MOTOR STOP ON WEATHER MACHINES
 ② COMMA IS PRINTED ON TAPE-PRINTING TELETYPEWRITERS
 ③ PERIOD IS PRINTED ON TAPE-PRINTING TELETYPEWRITERS

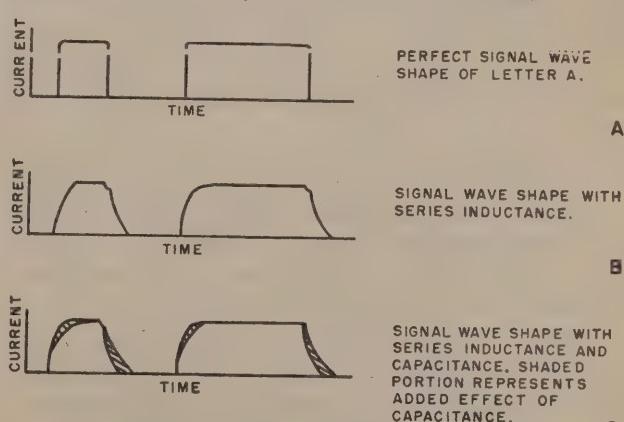
TL-9177A

Figure 60. Teletypewriter code.

(fig. 60). When the selecting mechanism of the receiving teletypewriter is adjusted correctly, it operates only during the central portion of the received signal impulse, requiring only 20 percent of the unit interval, or approximately 4 ms. It is apparent from the above that there are many factors that may cause false operation of the receiving teletypewriter. Improper adjustment of receiving and sending equipment may result in improper synchronization and consequent false operation. Link (connecting wire) leakage, line resistance, ground resistance, ground potentials (due to earth currents), and changes in electrical constants in the involved components may all create wave-shape distortion.

106. Transmitter-distributor

Instead of transmitting from a teletypewriter keyboard, it is frequently of advantage to transmit automatically by means of perforated tape. With this type of transmission, one or more operators may perforate tape as fast as it is convenient, and the previously prepared tape may be hand-fed through the automatic transmitter at a uniform rate, making use of the maximum speed capabilities of the circuits. The machine used for transmitting from such a perforated tape is called a *transmitter-distributor*, normally abbreviated TD. In the TD, a tape transmitter using the perforated tape sets up the code combinations to be transmitted on a set of five contacts. A commutator distributor (which corresponds to a distributor in an automobile) connects the line to each of these contacts in proper sequence at a speed of 60 wpm. The signals are transferred to the line through a distributor brush revolving around a commutator face which is split into seven segments. The brush first passes over the start segment, sending a space impulse over the line. As it continues to revolve, it successively connects the five code segments to the line for a character. Then the brush reaches the stop segment and sends out the stop impulse, a mark. Thus, one character is sent per revolution of the commutator brush. The output signals of a TD are neutral; that is, current flows during a mark impulse and no current flows during a space impulse. With the TD connected to a line circuit and in its idle (not transmitting) condition, its distributor brush will remain on the stop segment, sending a steady mark. For a detailed discussion of the TD, refer to TM 11-2222.

TM 264-46
Figure 61. Neutral signal waveshapes.

107. Typing Reperforator

a. The typing reperforator is a motor-driven mechanism for receiving and recording the messages in both code perforations and typewritten characters on the same tape. When used with a keyboard in local circuits, it serves the purpose of a keyboard tape perforator and transmitter. Receiving units of this kind are particularly adaptable for use at message centers, because the perforated tape may be prepared and later used to retransmit the message to one or more stations by means of a TD. This eliminates the necessity for manual transmission by direct keyboard or manual perforation of perforated tape. The type-

means of the TD, the end of the tape should include all the typewritten characters in the message, and the first typewritten messages must be preceded by at least six sets of code perforations in order to transmit the entire message. Detailed information covering the typing reperforator can be found in TM 11-2223.

108. Chad Tape

Radio Set AN/GRC-26 is not equipped with a tape perforator for punching out chad type tape, but the TD can handle both the chad and chadless types of tape. Chad type tape (fig. 63) is produced by a perforator with a standard

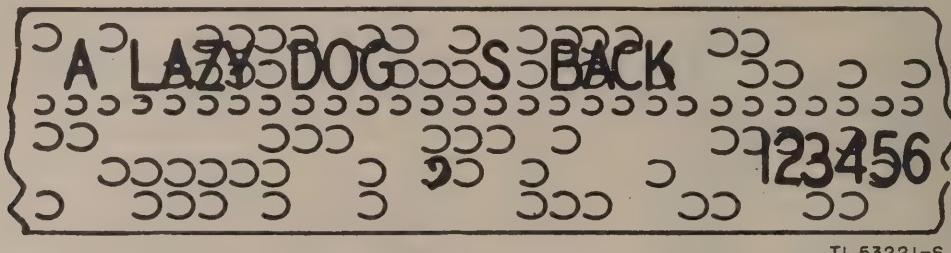


Figure 62. Chadless tape.

written characters on the tape facilitate identification and distribution at the message center.

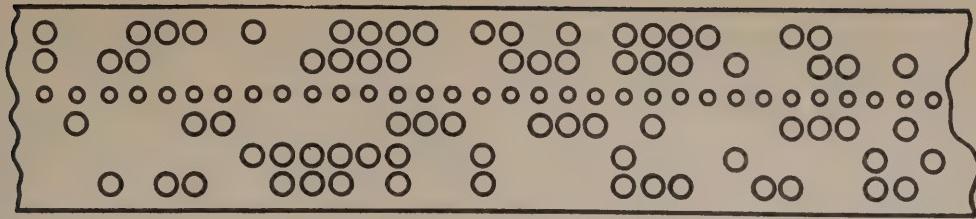
b. The typing reperforator uses a standard perforator tape which is 11/16 inch wide. A method of tape perforating known as *chadless perforating* is used to permit perforation of the tape in the same space that is occupied by the typewritten characters. The punchings, or chads, are not completely severed from the tape but remain attached to it at their leading edges to form lids over the holes (fig. 62). The legibility of the typewritten character is not impaired by this type of perforating because the perforating does not eliminate any portion of the tape.

c. Typing and perforating occur simultaneously, but since the typing platen is to the right of the perforator die block, characters are typed at the right of their respective perforation. *The separation between the typewritten character and its associated perforation is six character spaces.* This separation must be taken into account when tearing message tapes from the unit or in cutting the tape. When the tape is to be used for transmission by

teletypewriter keyboard. When a key is depressed, the desired code combination is recorded on the tape by perforating for the mark impulses and by not perforating for the space impulses. The start and stop impulses are not recorded on the tape. The small continuous line of holes in the tape (both chad and chadless types) are used to feed the tape through the perforator and the TD. The tape is read by moving it from right to left with two recorded impulses above the feed line and three below the feed line. The perforating mechanism consists essentially of a set of punches for perforating tape, a pair of punch magnets, and a punch hammer for operating the punches. Depressing a key positions six selector bars, five of which, through a series of lever actions, select the punches that are to be operated. The sixth selector bar closes the electrical circuit through the punch magnet, resulting in the punches being operated by the punch hammer. This type of perforator punches the tape clean.

109. Long Lines

In Radio Set AN/GRC-26, use is made of



TL 54910

Figure 63. Chad tape.

Wire WD-1/TT for various purposes. This wire consists of two single wires possessing the following electrical constants: resistance, leakage, inductance, and capacitance; all of which may or may not distort the original transmitted signal and cause false operation of the teletypewriters. The $\frac{1}{2}$ mile of wire included with this radio set will often be used in conjunction with accessory field lines made of Wire W-110-B or combat type wire.

a. **RESISTANCE.** Short lengths of heavy wire made of low-resistance metal will not offer much resistance to the flow of current. Long lines, made of this wire, offer appreciable resistance and may cause considerable attenuation of current. The resistance of a line is stated in terms of ohms per loop mile which is twice the ohmic resistance of 1 mile of Wire.

b. **LEAKAGE.** On all two-wire lines there will be a slight amount of leakage between the wires even though the wire insulation resistance is high. This leakage can be measured. Leakage is usually stated in terms of current conductance per mile of insulation. Conductance in *mhos*=1/resistance in ohms. The resistance is measured between the two unconnected wires. Leakage current in amperes can be found by multiplying the *mhos* per mile by the voltage difference between the wires.

c. **INDUCTANCE.** A magnetic field is set up about any conductor that is carrying current, regardless of the lengths of the conductor. While the inductive effects created by this field are insignificant in short lengths of line, they become appreciable in lines several miles long. The effect of this line inductance is to distort the waveshape (B, fig. 61) and change the frequency response of the line. In long lengths of line, capacitive effects predominate and additional inductance in the form of loading coils may be added to the line to cancel the capacitive effect and thus improve the frequency response (C, fig. 61). The unit of line inductance is the

henry per loop mile. Parallel wires may have a mutual inductive effect producing spurious responses in the other wires; in the case of telephone wires this causes *crosstalk*.

d. **CAPACITANCE.** The capacitive effect of a long line is caused by the two wires acting as the plates of a capacitor and the air, or insulation, between them acting as the dielectric (C, fig. 61). This effect increases with increase in the length of the line. In addition to the capacitance between wires there is also the capacitance of the wires to ground. The unit of capacitance in long line work is the microfarad per mile.

110. Electrical Systems

Two methods of transmitting teletypewriter signals on wire lines are normally used; the *neutral* system and the *polar* system.

a. **NEUTRAL SYSTEM.** In the neutral system, current is sent over the line to operate the teletypewriter selector mechanisms to the marking position, and the current is stopped to operate the relays to the spacing position. A marking current of 60 ma (milliamperes) is required to operate the teletypewriter relays. The NEUTRAL OUTPUT control of the dual diversity converter is used to adjust the steady marking current to 60 ma. Figure 61 shows the desired neutral d-c waveform and the normal changes resulting in that waveform from transmission over wire lines. The neutral system is entirely satisfactory over short lines, but where long lines are used, undesirable effects may appear.

(1) **Working voltages.** Long lines cause attenuation of the transmitted signal. The longer the line, the greater the attenuation, due to the increasing resistance of the wire between the transmitting and receiving teletypewriters. The sending voltage must be increased

to compensate for the drop in the line which in turn subjects the circuit to relatively high working voltages that might lead to breakdown of equipment.

- (2) *Leaky lines.* The sending equipment must be adjusted to supply 60 ma marking current to the receiving teletypewriter. Where there are lines having high leakage, as in tropical areas, the equipment must be constantly readjusted to supply this value of marking current. Assume that the proper adjustments had been made during a dry period of weather; after a heavy rain the wire would become soaked and a comparatively low resistance path to ground would be offered to the marking current. This ground path would act as a shunt to the remote circuit and would divert possibly 10 of the 60 ma required, resulting in less reliable operation of the receiving teletypewriter.
- (3) *Line bias.* While in the neutral system, a pulse of current for marking is followed by a no-current period for spacing; however, the condition of no current is never quite achieved in high speed transmission. The line accumulates a charge during the current period which never fully leaks away. This continual flow of residual current on teletypewriter lines causes distortion of the signals and is referred to as *bias*. Bias may vary from 1 or 2 ma, which does not affect the fidelity of transmission to any great degree, to a value that will create false operation of the receiving teletypewriter. Where a bias exists, the length of the mark impulses will be increased, and the space impulses decreased. Distortion Test Set TS-383/GG may be used to measure the amount of distortion in teletypewriter signals. Test Set TS-2/TG may be used to check teletypewriter components for operational efficiency.

b. POLAR SYSTEM. In the polar system, current is sent over the wire in one direction for the marking impulses and in the other direction for the spacing impulses (fig. 64). The polar

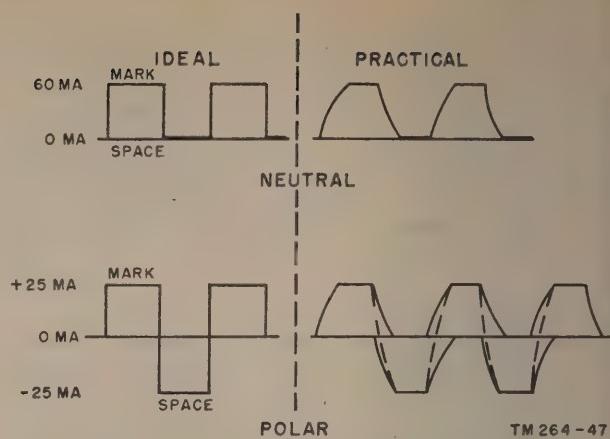


Figure 64. Neutral and polar waveshapes.

system is used where long lines are required. This system possesses a number of advantages over the neutral system.

- (1) *Working voltages.* The transmission of current for spacing gives the effect of increased voltage without increasing the current values in any part of the circuit. Therefore, the circuit is not subjected to as high working voltages as in the neutral system.
- (2) *Line bias.* The presence of bias on the line has little effect on the resulting waveform of the transmitted signal with the polar system. If the mark and space currents have been correctly adjusted at the sending end of the circuit, the charges remaining from the positive and negative impulses cancel, leaving the waveform undisturbed.

III. Methods of Line Construction

In the field, a well-constructed open-wire line will probably be suitable for keying and remote control functions over any distance which that service installation requires. When other types of wire are used, such as Wire WD-1/TT, Wire W-110-B, spiral four cable, or Wire W-143, distortion difficulties may be present, depending on the nature of the wire and how it is installed.

a. AERIAL AND GROUND LINES. In general, pole-line construction is preferable to laying the wire on the ground. Trouble is less likely to occur and is easier to find on aerial lines. Shorts to ground are far less frequent. With

insulated pairs, especially field wire pairs, ground-laid lines are reliable for only a short period of time.

b. WEATHER CONDITIONS. The operating ranges of field wires are considerably shorter in wet weather than in dry weather. Moisture seeps into and around the wires, and causes corrosion on splices which results in poor connections. Weatherproof wires and rubber-covered cables will give satisfactory results as long as all splices and cable connections are well taped to keep moisture from entering and causing corrosion and leakage.

c. JUNGLE LINES. An exception to the practice of pole-line construction occurs in the case of lines passing through jungle areas. Aerial construction fails to afford its usual amount of

insulation from the ground because of the impossibility of keeping the lines clear of damp vines and trees. An objectionably high noise level is caused by branches and leaves or trees and vines continually swinging against the overhead wire.

d. ALTERNATE CONTROL LINES. It is a good practice to lay an additional set of control lines over a different physical route than that followed by the original line. If for any reason the regular line becomes inoperative, an alternate set of lines is available and communication will not be interrupted. Alternate control lines are often run at the same time and alongside of the original line. The original inoperative line is disconnected and the ends of the alternate line brought into the same terminal strip as the original lines and made available for use.

CHAPTER 6

FIELD MAINTENANCE INSTRUCTIONS

Note. This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available, and by the skill of the repairman.

Section I. PREREPAIR PROCEDURES

112. Tools, Materials, and Test Equipment

Tools, materials, and test equipment needed for performing prerepair procedures are as follows:

Tool Equipment TE-113.
Test Unit I-176.
Tube Tester I-177.
Solvent (SD).
Crocus cloth.
Emery cloth.
Cheesecloth.

113. Removal of Pluck-out Parts

Instructions for removing tubes, fuses, and pilot lamps from the various units may be found in the individual equipment technical manuals. Make sure that the tubes have cooled before removing them. Unfasten any grid or plate caps and tube holders. Do not rock the tube or jiggle it in its socket if it can be extracted by a direct upward pull. Rock it gently if it does not release easily. Jiggling a tube in its socket during removal spreads the contacts. Label each tube as soon as it is removed so that it can be replaced later in its proper socket.

114. Cleaning, Inspecting, and Testing Tubes

a. CLEANING. Clean the tubes with a cloth moistened with solvent (SD); if necessary, clean the grid caps and prongs with crocus cloth.

b. INSPECTING. Inspect the tubes for cracks in the glass envelope and for bent and broken prongs.

c. TESTING. Test the tubes for proper emission, leakage, and short circuits; use a tube tester or place doubtful tubes in a receiver (or other unit) known to be operating normally.

115. Inspecting, Cleaning, and Testing Fuses

a. INSPECTING. Inspect fuse ends for evidence of burning, corrosion, and looseness.

b. CLEANING. Clean fuse ends with emery cloth and wipe with a clean cloth. If a file is used to remove deep pits, use crocus cloth to leave a smooth contact surface and then wipe dry with a clean cloth.

c. TESTING. Check fuses for continuity.

116. Inspecting Pilot Lamps

Inspect the lamps for continuity of filament and make sure that the lamp bases are not loose.

117. Cleaning and Inspecting Chassis

a. CLEANING. Thorough cleaning of all the chassis is necessary to insure optimum performance by preventing corrosion, rust, and dust from damaging parts or causing arc-over or low-resistance leakage between high-voltage points and ground. Remove loose dust with a brush or blower. With a brush or cloth and solvent (SD), remove dirt and grease which adhere to the chassis and parts. Clean rotary switches and connector contacts with a small brush or pipe cleaner and solvent (SD).

b. INSPECTING. After the chassis has been thoroughly cleaned, make a visual inspection of parts and wiring for corrosion, rust, loose connections, frayed and burned insulation, loose hardware, loose solder, and burned or charred resistors and capacitors. Inspect tube sockets for broken contacts, and inspect switches for loose or bent contacts and broken insulation. Check terminal boards for loose terminals and cracks or indications of burning. Examine connectors for loose, corroded, or broken contacts. Inspect and tighten all loose setscrews and other hardware.

118. Reassembling Equipment

Replace all tubes, fuses, pilot lamps, and other pluck-out parts, reversing the procedure of removal. Be sure that the tubes are put back

in the correct sockets. Replace grid and plate caps and fasten tube holders where required. See individual equipment technical manuals for more complete information.

Section II. TROUBLE SHOOTING AT FIELD MAINTENANCE LEVEL

Warning: When servicing the radio transmitter, be extremely careful because of the high voltages exposed. Always throw the PLATE POWER switch to OFF and the C.W.-PHONE switch to C.W. before starting any testing. With the high voltage off, potentials as high as 1000 volts are still present in the transmitter. Keep one hand in a pocket when measuring voltages with the probe. Before touching any part after the voltage is turned off, short the part to ground.

119. Trouble-shooting Procedures

The first step in servicing a defective radio set is to sectionalize the fault. Sectionalization means tracing the fault to the *major component or circuit* responsible for the abnormal operation of the set. The second step is to localize the fault. Localization means tracing the fault to the defective *part* responsible for the abnormal condition. Some faults such as burned-out resistors, r-f arcing, and shorted transformers can often be located by sight, smell, and hearing. The majority of faults, however, must be localized by *checking voltage and resistance*.

a. **SYSTEM SECTIONALIZATION.** System sectionalization is discussed in paragraphs 83, 84, and 85. Radio Set AN/GRC-26 should be set up for operation, following the steps given in the starting procedure (par. 46). Check the operation of components against the equipment performance checklist (par. 85) until an abnormal indication is noted. Refer to the trouble-shooting chart (par. 129), which will often indicate the probable causes of trouble and corrective measures which should be taken. If the chart does not give sufficient information, the trouble must be localized within the defective component.

b. **LOCALIZATION.** Localization is the tracing of an equipment fault to a particular part. Localization of trouble within a component of Radio Set AN/GRC-26 may be accomplished by following instructions in individual technical manuals which are furnished. For example, a fault in Radio Transmitter T-213/GRC-26 may be located by following instructions for Radio Transmitter BC-610-(*) in TM 11-281, TM 11-4057, and TB SIG 220. Methods of using

trouble-shooting data, such as voltage and resistance measurements, are given in paragraphs 122 through 127.

120. Trouble-shooting Data

Take advantage of the material supplied in this manual. It will help in the rapid sectionalization of faults. Consult trouble-shooting data in the other technical manuals furnished and the following material in this manual:

Fig. or Par. No.	Description
Fig. 45.....	Perforator connection box patching circuits.
Fig. 48.....	Radio Receiver R-336/GRC-26, h-f oscillator, schematic diagram.
Fig. 49.....	Radio Receiver R-336/GRC-26, mixer stage, schematic diagram.
Fig. 50.....	Radio Receiver R-336/GRC-26, i-f amplifier output connection, schematic diagram.
Fig. 51.....	Rectifier RA-20-B, schematic diagram.
Fig. 52.....	Radioteletypewriter Control C-535/GRC-26, schematic diagram.
Fig. 53.....	Radioteletypewriter Control C-535/GRC-26, simplified schematic diagram.
Par. 129....	Trouble-shooting chart.
Fig. 65.....	Radioteletypewriter Control C-535/GRC-26, bottom view.
Fig. 66.....	Rectifier RA-20-B, bottom view of chassis.
Par. 130....	Continuity table for Radioteletypewriter Control C-535/GRC-26.
Fig. 54.....	Control Box C-345A/MRC-2, schematic diagram.
Fig. 55.....	Radio Set AN/GRC-26, functional diagram, receiver and transmitter disabling.
Fig. 67.....	Capacitor color codes.
Fig. 68.....	Resistor color codes.
Fig. 69.....	Wiring diagram of Power Unit PE-95-G.
Fig. 70.....	Rectifier RA-87, schematic diagram.
Fig. 71.....	Line Unit BE-77-A, schematic diagram.
Fig. 72.....	Rectifier Power Unit RA-133-A, schematic diagram.
Fig. 73.....	Test Unit I-176, schematic diagram.
Fig. 74.....	Telephone EE-8-B, schematic diagram.

Fig. or Par. No.	Description
Fig. 75.....	Radio Set AN/GRC-26, transmitting and receiving block diagram.
Fig. 76.....	Radio Set AN/GRC-26, schematic diagram of wiring interconnections.
Fig. 77.....	Radio Receiver R-336/GRC-26, schematic diagram.
Fig. 78.....	Radio Set AN/GRC-26, cording diagram.
Fig. 79.....	Radio Transmitters BC-610-F and BC-610-G, schematic diagram.
Fig. 80.....	Speech Amplifier BC-614-H, schematic diagram.

121. Test Equipment Required for Trouble Shooting

The test equipment required for testing components of Radio Set AN/GRC-26 is listed below. The technical manuals associated with the test equipment are also listed.

Test equipment	Technical manual
Test Unit I-176 or equal.....	11-2626
Multimeter TS-297/U, or equal.....	11-5500
Tube Tester I-177.....	11-2627
Frequency Meter BC-221-(*).....	11-300

Test equipment required for trouble shooting the teletypewriter equipment is specified in paragraph 109, TM 11-2223; paragraph 51, TM 11-2222; and in paragraph 104, TM 11-352.

122. Voltage Measurements

a. GENERAL. Voltage measurements are an almost indispensable aid to the serviceman because most troubles either result from abnormal voltages or produce abnormal voltages. Voltage measurements are taken easily because they are always made between two points in a circuit. The circuit need not be interrupted.

- (1) Complete information on normal operating voltages is given in the trouble-shooting section. Unless otherwise specified, voltages listed on the voltage charts are measured between the indicated points and ground.
- (2) Always begin by setting the voltmeter on the *highest* range so that the voltmeter will not be overloaded. Then, if it is necessary to obtain increased

accuracy, set the voltmeter to a lower range.

- (3) When checking cathode voltage, remember that a reading can be obtained when the cathode resistor is actually open, as the resistance of the meter may act as a cathode resistor. Before measuring cathode voltage, make a resistance check with the circuit voltages turned off to determine if the cathode resistor is open.

b. PRECAUTIONS AGAINST HIGH VOLTAGES. High voltages are dangerous and can be fatal. Certain precautions *must* be followed when measuring voltages above a few hundred volts. When it is necessary to measure high voltage, observe the following rules:

- (1) Connect the ground lead to the voltmeter.
- (2) On h-v checks, also ground the case or panel of test instruments, if made of metal.
- (3) Place one hand in your pocket.
- (4) If the voltage is less than 300 volts, checks may be made with the power on by touching the probe of the test lead to the hot terminal.
- (5) If the voltage is greater than 300 volts, shut off the power, connect the hot test lead, step away from the voltmeter, turn on the power, and note the readings on the voltmeter. DO NOT TOUCH ANY PART OF THE VOLTMETER.

c. VOLTMETER LOADING. It is essential that the voltmeter resistance be at least 10 times as large as the resistance of the circuit across which the voltage is measured. If the voltmeter resistance is comparable to the circuit resistance, the voltmeter will indicate a lower voltage than the actual voltage present when the voltmeter is removed from the circuit.

- (1) The resistance of the voltmeter always may be calculated by the following simple rule—Resistance of voltmeter equals the ohms-per-volt multiplied by the full-scale range in volts.
- (2) To minimize voltmeter loading in high-resistance circuits, use the highest voltmeter range. The decreased loading of the voltmeter more than compensates for the inaccuracy which

results from reading only a small deflection on the scale of the voltmeter.

123. Resistance Measurements

a. **GENERAL.** When a fault develops in a circuit, its effect very often shows up as a change in the resistance values. To assist in the localization of such faults, trouble-shooting data include the normal resistance values, as measured at the tube sockets, and at test jacks or at terminal boards. These values are measured between the indicated points and ground, unless otherwise stated.

(1) Precautions.

(a) Before making any resistance measurements, disconnect the power source. An ohmmeter is essentially a low-range voltmeter and battery. If the ohmmeter is connected in a circuit which already has voltages in it, the needle will be knocked off scale and the voltmeter movement may be burned out.

(b) Capacitors must always be discharged before resistance measurements are made.

(2) *Correct use of high and low ranges.* It is important to know when to use the low-resistance and high-resistance ranges of an ohmmeter when checking any circuit. When checking circuit continuity, the ohmmeter should be set on its lowest range. If a medium or high range is used, the pointer may indicate zero ohms even if the resistance is as high as 500 ohms. When checking high resistances or measuring the leakage resistance of capacitors or cables, the highest range should be used. If a low range is used, the pointer will indicate infinite ohms even though the actual resistance is less than a megohm.

(3) *Parallel resistance connections.* In a parallel circuit, the total resistance is less than the smallest resistance in the circuit. This is important to remember when trouble shooting with the aid of a schematic diagram.

(a) When a resistance is measured, and the value is found to be lower than expected, make a careful study of

the schematic to be certain that there are no resistances in parallel with the one that has been measured. Before replacing a resistor, disconnect one terminal from the circuit and check the resistance again to make sure that the low reading was not due to another parallel connection.

(b) Sometimes it will be found that there is a coil or transformer winding in parallel with the resistor. In this case, the resistor must be checked by removing one terminal from the circuit and then measuring its resistance.

(4) *Tolerance values of resistance measurements.* The tolerance of a resistor refers to the difference between the rated value and the actual value of the resistor.

(a) Most resistors used in radio circuits have a tolerance of 10 percent. For instance, the rated value of a grid resistor is said to be 1 megohm. If the actual measurement varies between 0.9 and 1.1 megohms, it will be considered as normal. With precision resistors and potentiometers, the tolerance allowed will appear on the part. Most ohmmeters are not too accurate; use a resistance bridge for measuring precision type resistors.

(b) The tolerance value for transformer windings is usually between 1 and 5 percent. Any transformer winding showing more than that allowable deviation in resistance should be checked very closely.

b. **HIGH-RESISTANCE MEASUREMENTS.** Many leakages will not show up when measured at low voltages. It may be necessary at some time to check the resistance of components to a common ground, such as when determining whether or not transformer windings are shorting to the transformer case or core, or when determining whether or not the conductor within a length of coaxial cable is shorting to the outer shield. A voltage supply of approximately 300 volts can be connected in series with the 300-volt range of a voltmeter and both elements of the component suspected to be faulty. A

leakage path will be indicated by a voltage reading.

124. Capacitor Tests

Capacitors which are leaky or shorted can be found by resistance measurement checks of the stage. A capacitor suspected of being open can best be checked by shunting a good capacitor of approximately the same value across it. It should be remembered that a leakage value of 50-100 microamperes per μ f is normal for electrolytic capacitors. When using an ohmmeter to check electrolytics, the polarity of the capacitor must be observed.

125. Current Measurements

Current measurements other than those indicated by the panel meters are not ordinarily required in trouble shooting the r-f sections radio set. Under special circumstances, where the voltage and resistance measurements alone are not sufficient to localize the trouble, a current measurement can be made by opening the circuit and connecting an ammeter to measure the current. Series measurements of currents in teletypewriter lines are often made for trouble location purposes.

a. When the meter is inserted in a circuit to measure current, it should always be inserted away from the r-f end of the resistance. For example, when measuring plate current, do not connect the meter next to the plate of a tube, but insert it next to the end of the resistor which connects to the power source.

Caution: When measuring current, always set the meter at its highest range. Then, if necessary, decrease the range of the meter to obtain an accurate reading.

b. In most cases, the current flows through a resistance which is either known or can be measured with an ohmmeter. The current flowing in the circuit can be determined by dividing the voltage drop across the resistor by its resistance value. This method is better than that above because it does not subject the relatively delicate ammeter to damaging voltages.

126. Tubes

a. **TUBE FAILURES.** Tube failures are responsible for a large percentage of the faults which occur in radio sets. Do not attempt to find the

source of trouble in Radio Set AN/GRC-26 by indiscriminately changing tubes. Do not resort to tube changing until the trouble has been traced to a particular stage.

b. **TUBE CHECKING.** Tube checkers are used to check either the emission or the mutual conductance of the tubes and to test for shorted elements. They will not test the performance of h-v tubes or rectifiers; however, they are useful for checking receiving type tubes used in the receivers and in the converter, control, and exciter units. Remember that the results obtained from the tube checker are not obtained under the same conditions as those under which the tube operates in the set. For this reason, the final test of a tube must be its replacement with a tube that is known to be good.

127. Use of Frequency Meter

Frequency Meter BC-221-(*) can sometimes be used to locate defective stages in the various units. The signal output of the frequency meter can be fed to the input stages of a receiver and then traced through the successive circuits.

128. Operational Test

a. If the item of equipment being repaired is installed as part of Radio Set AN/GRC-26, operate the equipment in accordance with the equipment performance checklist in paragraph 85. The checklist frequently indicates the general location of trouble. Refer to the troubleshooting chart in paragraph 129 to locate a possible source of trouble. More detailed information should be obtained from equipment technical manuals.

b. If the equipment is being checked apart from Radio Set AN/GRC-26 follow the troubleshooting procedure described in individual equipment technical manuals.

129. Trouble-shooting Chart

The following chart is supplied as an aid in locating trouble in Radio Set AN/GRC-26. This chart lists the symptoms which the repairman may observe while operating the equipment. The procedure for starting the set given in paragraph 46 should be followed. The information in this paragraph is in the same sequence as the steps in the starting procedure. For troubles in components other than those described below, refer to individual equipment technical manuals as indicated.

Symptom	Probable trouble	Correction
1. Power Unit PE-95-G fails to start when START button is pressed.	1. MANUAL-REMOTE switch on power unit in MANUAL position. Discharged batteries in power unit. Defective power unit..... 2. Faulty connection at either end of Power Cable Assembly CX-1165/U and Power Cable Assembly CX-1166/U. Circuit breaker on panel of power unit in OFF position. Circuit breaker on shelter wall in OFF position.	1. Set MANUAL-REMOTE switch to REMOTE position. Start power unit with hand crank; MANUAL-REMOTE switch in MANUAL position. Refer to TM 11-904. 2. Check connections at power unit and shelter. Set circuit breaker on panel of power unit to ON position. Set to ON position.
2. Power Unit PE-95-G starts but no power available at shelter.		
3. Frequency shift exciter dial or a-c indicator lamps will not light when a-c switch is set to ON.	3. Defective fuse..... Defective lamps..... No a-c power to exciter.....	3. Replace fuse F-101, F-102, or both. Replace dial or indicator lamp. Check connection to wall socket. Check Cord CX-962/TRA-7, replace if necessary. Refer to TM 11-278.
4. Frequency shift exciter OVEN indicator will not light when OVEN switch is first turned ON.	4. No a-c power to exciter	4. Check Cord CX-962/TRA-7, replace if necessary. Check connection to wall socket. Replace OVEN indicator lamp.
5. Exciter BUFFER INDICATOR will not light.	5. Exciter controls not adjusted properly. Open circuit in exciter control relay wiring. Defective BUFFER INDICATOR lamp, or lamp loose in socket. Defective tube.....	5. Check settings of all controls in accordance with operating instructions. Check for faulty connection in either end of Cord CX-961/TRA-7 (red). Disconnect key cord plug from C.W. KEYING jack on radioteletype-writer control. Tighten or replace BUFFER INDICATOR lamp. Replace tube V-101, V-102, or V-104. Refer to TM 11-278.
6. No beat note heard in headset when making final adjustments to frequency shift exciter OSCILLATOR-OR TUNING dial.	6. Headset not connected to proper PHONES jack. Exciter, frequency meter, or transmitter improperly adjusted. Defective tube in monitoring circuit. Defective audio Cord CG-390/U..	6. Connect plug from headset cord to PHONES jack on exciter panel. Check settings and readjust controls on exciter unit, frequency meter, and transmitter, in accordance with operating instructions. Replace tube V-107, V-108, V-109, or V-104. Check connections on Cord CG-390/U. Repair or replace if necessary.
7. Audio tone from frequency shift exciter 850-cycle test oscillator not heard in headset.	Defective Pick-up Antenna AT-137/MRC-2. Defective frequency meter..... 7. Headset not connected to proper PHONES jack. Wrong setting of exciter controls.. Defective tube.....	Check connection at Pick-up Antenna AT-137/MRC-2. Repair or replace if necessary. Refer to TM 11-300. Refer to TM 11-278. 7. Connect plug from headset cord to PHONES jack on exciter panel. Check exciter controls in accordance with operating instructions. Replace tube V-107, V-108, V-109, or V-104. Refer to TM 11-278.

Symptom	Probable trouble	Correction
8. Frequency shift exciter 850 TEST indicator does not function when audio beat is heard in headset.	8. Defective tube.....	8. Replace tube V-110. Refer to TM 11-278.
9. Operating TEST key on frequency shift exciter from MARK to SPACE causes no change in transmitted frequency.	9. Defective tube.....	9. Replace tube V-103. Refer to TM 11-278.
10. No filament power when radio transmitter FILAMENT VOLTAGE switch is set at ON.	10. Defective fuse..... Faulty power cord connection.....	10. Replace fuse FS-1, FS-2, or FS-4. Check connections on power Cord CD-763. Refer to TM 11-281.
11. Transmitter PLATE POWER indicator lamp does not light when exciter TEST key is set at MARK or SPACE or when TRANSMITTER switch on control unit is set at ON.	11. Transmitter overload relay open..... Defective lamp..... Defective fuse..... Defective TRANSMITTER switch in control unit..... Faulty control wire connection....	11. Press transmitter OVERLOAD RESET switch. Replace indicator lamp. Replace fuse FS-5. Replace control unit TRANSMITTER switch. Check connections at either end of Cord CX-961/TRA-7 (blue). Check connections at either end of Cord CX-961/TRA-7 (red). Check plug connections at either end of Special Purpose Cable Assembly CX-1152/U. Check connections at either end of Cord CX-958/TRA-7. Check connections at either end of Cord CD-764.
12. No current indication on radio transmitter EXCITATION METER when meter switch is set to INT. AMP GRID position. (Transmitter PLATE POWER indication lamp lighted.)	12. Wrong tuning unit selected	12. Check to see that proper tuning unit is being used. Check BAND SWITCH for correct position. Check MO-XTAL switch on tuning unit (should be in XTAL position). Check adjustment of DOUB control in accordance with operating instructions. Check for faulty connection of either end of Cord CG-389/U. Transmitter end should be plugged into tuning unit being used.
	Transmitter or controls not adjusted or set correctly.	Replace tube V-8, V-9, or V-12. Refer to TB SIG 220 and TM 11-4057
13. No current indication on transmitter EXCITATION METER when meter switch is set to P.A. GRID position.	13. Tuning unit control not adjusted correctly.....	13. Check adjustment of INT AMP knob on tuning unit in accordance with operating instructions. Replace tube V-9, V-10, V-11, V-12, or V-16. Refer to TB SIG 220.
14. No indication or radio transmitter plate current on P.A. PLATE current meter (red light on).	14. Coil unit out or improperly installed in transmitter..... Defective tube in transmitter.....	14. Check for proper installation of coil unit in transmitter. Replace tube V-16, V-6, or V-7. Refer to TB SIG 220.
15. FILAMENT POWER switch on transmitter in ON position. Speech amplifier red lamp fails to light.	15. Transmitter fuse FS-5 open..... Lamp LM-101 burned out..... Cord CD-764 defective.....	15. Replace fuse. Replace lamp. Repair or replace cord.
16. Transmitter cannot be modulated....	16. Cord CD-764 defective..... Tube V-107 defective.....	16. Repair or replace cord. Replace tube V-107. Refer to TM 11-281.

Symptom	Probable trouble	Correction
17. Transmitter can be modulated by one microphone but not by the other.	17. Microphone defective..... Microphone jack defective.....	17. Replace microphone. Repair jack. Refer to TM 11-281.
18. Transmitter cannot be keyed from KEY jack at speech amplifier.	18: Cord CD-764 defective..... Key jack defective.....	18. Repair or replace cord. Repair jack. Refer to TM 11-281.
19. Converter pilot lamps do not light...	19. Defective fuse..... Defective lamps..... No a-c power to converter..... Defective converter.....	19. Replace fuse F-301 or F-302. Replace indicator lamps. Check power Cord CX-954/TRA-7 and connections. Refer to TM 11-278.
20. Receivers receive teletypewriter signal but converter meter B on INPUT position reads 0.	20. Défective RF Cable Assembly CG-562/U.	20. Check cords and connectors.
21. Dial lights on receiver OFF-M.V.C.-A.V.C. do not light when switch is turned to M.V.C.	21. Defective fuse..... Defective lamps..... No a-c power to receiver..... Defective receiver.....	21. Replace DYN.-FIL. fuse on the front of the panel. Replace dial lamps. Check power cord and outlet. Refer to TM 11-850.
22. Dial lights on receiver light but no sound heard in speaker or phones.	22. Plugs not in proper jacks..... Insufficient volume..... Defective receiver.....	22. Check that cords from Control Box C-345(*)/MRC-2 are plugged into the 2ND AUDIO jack of the proper receiver and that Cords CD-267 are connected between speakers and control box. See that volume controls on receivers and Control Box C-345(*)/MCR-2 are increased sufficiently. Refer to TM 11-850.
23. Receiver seems operative but no signals can be heard.	23. Defective antenna Cord CG-67/MRQ-2. Defective antenna connection.....	23. Check cable and connectors.
24. Receivers not disabled when operating one-way reversible.	24. Defective Cords CX-955/TRA-7.. Defective Cords CX-957/TRA-7.. Defective Special Purpose Cable Assembly CX-1150/U. Control unit TRANSMITTER switch in wrong position. Receiver SEND-REC switch in wrong position.	24. Check antenna cord connections at mast base and receiver. Check cords and connectors. Check cords and connectors. Check cord and connectors.
25. On Control Unit C-292(*)/TRA-7, AC SUPPLY indicator lamp does not light when AC SUPPLY switch is in ON position.	25. Defective fuse..... Defective lamp..... No a-c power to control unit..... Defective switch.....	25. Check that control unit TRANSMITTER switch is in ON position while transmitting. Check that receiver SEND-REC switch is in SEND position. Refer to TM 11-278.
26. No SEND LINE CURRENT at control unit.	6. Defective Cord CX-958/TRA-7... Defective Cord CX-961/TRA-7 (blue).	26. Replace fuse F-101 or F-102. Replace indicator lamp. Check power Cord CX-959/TRA-7. Replace AC SUPPLY switch. Refer to TM 11-278.
27. No REC LINE CURRENT at control unit.	27. Defective Cord CX-957/TRA-7... Defective Special Purpose Cable Assembly CX-1151/U.	26. Check Cord CX-958/TRA-7 and connectors. Check Cord CX-961/TRA-7 (blue) and connectors. Refer to TM 11-278.
28. Teletypewriter motor does not run when MOTOR switch is set to ON position.	28. Defective fuse..... Defective MOTOR switch..... No a-c power to teletypewriter.... Defective teletypewriter.....	27. Check cord and connectors. Check cord and connectors. Refer to TM 11-278. 28. Replace fuse. Replace switch. Check a-c cord, plug, and outlet. Refer to TM 11-352.

Symptom	Probable trouble	Correction
29. Receiving teletypewriter runs open with converter OUTPUT switch on MARK.	29. Incorrect switch position on radio-teletypewriter control. Teletypewriter red plugs not in proper jack. Red plug or cord defective..... Defective teletypewriter.....	29. Check that radioteletypewriter control RECEIVE-OFF-SEND switch for teletypewriter in use is in RECEIVE position and NORMAL-EXTENSION switch is in NORMAL position. Check that teletypewriter red plug is plugged into proper jack on teletypewriter control. Refer to figure 78. Repair or replace defective cord or plugs. Refer to TM 11-352.
30. Teletypewriter signal is noted on control unit meter in REC LINE CURRENT position but receiving teletypewriter does not receive copy.	30. Incorrect connections of teletypewriter red and black plugs. Incorrect switch position on teletypewriter control.	30. Check that plugs are correctly connected to teletypewriter control. Refer to figure 78. Check that RECEIVE-OFF-SEND switch for teletypewriter in use is in RECEIVE position.
31. Sending teletypewriter runs open....	31. Incorrect switch position on teletypewriter control. Teletypewriter red and black plugs not in proper jacks. Red and black cords or plugs defective. Defective Cord CX-956/TRA-7... Defective red and black jacks on radio teletypewriter control. Insufficient holding current from control unit.	31. Check that teletypewriter control RECEIVE-OFF-SEND switch for teletypewriter in use is in SEND position, and NORMAL-EXTENSION switch is in NORMAL position. Check that teletypewriter red and black plugs are plugged into proper jacks on teletypewriter control. Repair or replace defective cords or plugs. Check cord and connectors. Replace or repair defective jacks.
32. Sending teletypewriter holds when BREAK key is depressed	32. Teletypewriter cord with black plug not in proper jack. Defective black cord or plug..... Defective jack on teletypewriter control. Defective Cord CX-956/TRA-7... Holding current not removed.....	Check holding current (SEND EXT CURRENT) at control unit; should be 75 to the right of 0. Refer to TM 11-352. Refer to TM 11-278. 32. Check that black plug is connected to proper jack on teletypewriter control. Refer to figure 78. Replace or repair defective cord or plug. Replace or repair defective jack.
33. Perforator-transmitter motors do not run when switches are in ON position.	33. Defective fuse..... Defective motor switches..... No a-c power.....	Check cord and connectors. Check holding current (SEND EXT CURRENT) at control unit; should be 0. Refer to TM 11-352. Refer to TM 11-278.
34. Perforator runs open.....	34. Cords with red and black plugs not in proper jacks.	33. Replace fuse. Replace switches. Check power cord, plug, and outlet. Connect to a-c outlet. 34. Check that red and black plugs are connected to proper jacks on teletypewriter control. Refer to figure 78.

Symptom	Probable trouble	Correction
35. Transmitter-distributor does not run when STOP-SEND switch is in SEND position.	Defective cords or plugs (red and black). Defective jacks on teletypewriter control. Defective d-c cord from perforator connection box. Defective Special Purpose Cable Assembly CX-1120/U. Special Purpose Cable Assembly CX-1120/U not properly connected. Rectifier RA-87 not on..... Defective fuse in rectifier..... Defective rectifier a-c cord..... 35. Stop rod stuck..... Defective switch..... Defective unit.....	Replace or repair defective cord or plug. Replace or repair defective jacks. Repair cord. Connect to d-c outlet of Rectifier RA-87. Replace or repair defective cord or plug. Check that proper connections are made in connection box and teletypewriter control. Set switch to ON. Replace fuse. Check and repair cord. Connect to a-c outlet. Repair or replace switch. Refer to TM 11-957. 35. Release rod. Replace switch. Push clear button, located on lower right side near front of TD. (This button is unlabeled.) Refer to TM 11-2222.

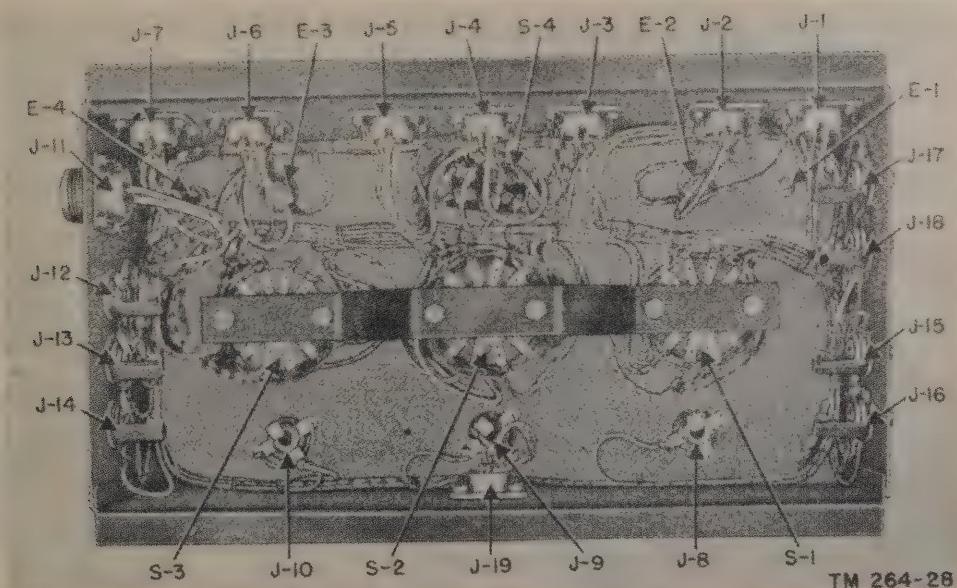


Figure 65. Radioteletypewriter Control C-535/GRC-26, bottom view.

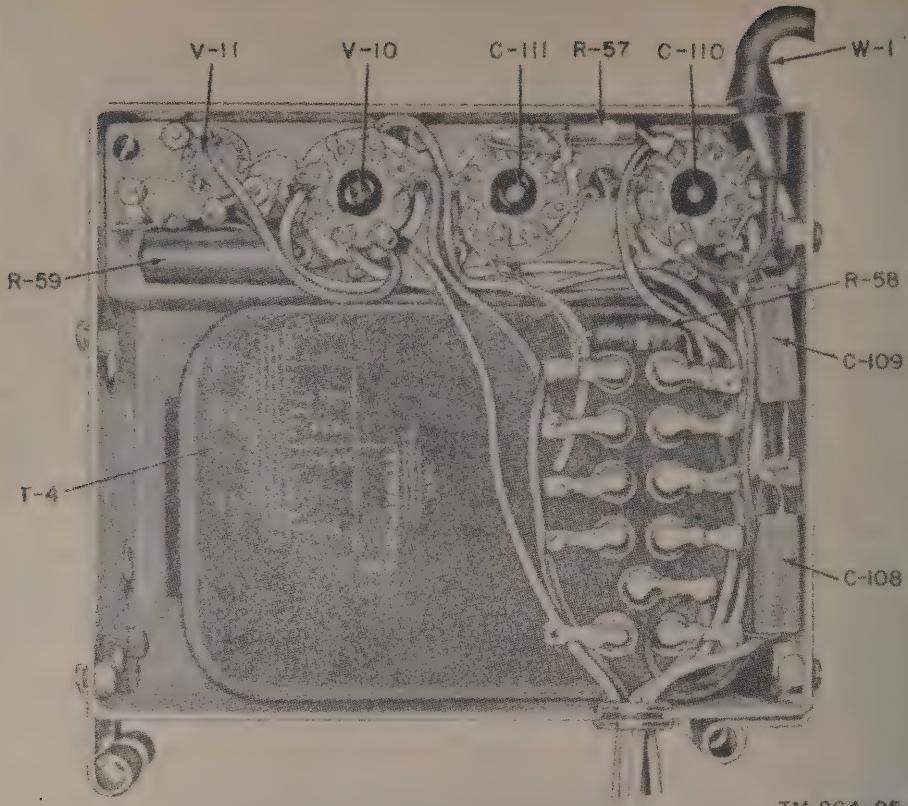


Figure 66. Rectifier RA-20-B, bottom view of chassis.

I30. Continuity Table for Radioteletypewriter Control C-535/GRC-26

LEFT TT-55/MGC switch position	RIGHT TT-55/MGC switch position	REPERFORATOR CONNECTED TO switch position	Continuity between	LEFT TT-55/MGC switch position	RIGHT TT-55/MGC switch position	REPERFORATOR CONNECTED TO switch position	Continuity between
ANY.....	ANY.....	ANY.....	FS KEYING tip contact—J-1A.	ANY.....	ANY.....	ANY.....	J-4B—J-6B
ANY.....	ANY.....	ANY.....	FS KEYING sleeve contact—Ground	ANY.....	ANY.....	ANY.....	J-4C—Ground
ANY.....	ANY.....	ANY.....	J-1D—J-3D	ANY.....	ANY.....	ANY.....	J-4D—J-6D
ANY.....	ANY.....	ANY.....	J-1C—Ground	ANY.....	ANY.....	ANY.....	J-6A—Ground
ANY.....	ANY.....	ANY.....	J-1B—Ground	ANY.....	ANY.....	ANY.....	J-6C—Ground
ANY.....	ANY.....	ANY.....	J-2A—Ground	SEND....	RECEIVE.	LEFT TT-55/MGC	J-7A—J-19A
ANY.....	ANY.....	ANY.....	J-2B—J-3A	SEND....	RECEIVE.	LEFT TT-55/MGC	J-7B—J-19C
ANY.....	ANY.....	ANY.....	J-2D—Neutral TT from CV-31A/TRA-7 Jack	SEND....	RECEIVE.	LEFT TT-55/MGC	J-7C—CW KEYING
ANY.....	ANY.....	ANY.....	J-2E—Ground	SEND....	RECEIVE.	LEFT TT-55/MGC	J-7D—CW KEYING
ANY.....	ANY.....	ANY.....	J-3C—Ground	SEND....	RECEIVE.	LEFT TT-55/MGC	J-5B—J-12
ANY.....	ANY.....	ANY.....	J-3B—Ground	SEND....	RECEIVE.	LEFT TT-55/MGC	J-5C—J-12
ANY.....	ANY.....	ANY.....	J-4A—Ground	SEND....	RECEIVE.	LEFT TT-55/MGC	J-5A—J-15
							J-5A—J-13
							J-5B—J-15
							J-5B—J-13
							J-5B—J-16

LEFT TT-55/MGC switch position	RIGHT TT-55/MGC switch position	REPERFORATOR CONNECTED TO switch position	Continuity between
SEND....	RECEIVE.	LEFT TT- 55/MGC	J-5B—J-14
SEND....	RECEIVE.	LEFT TT- 55/MGC	J-5C—J-16
SEND....	RECEIVE.	LEFT TT- 55/MGC	J-5C—J-14
SEND....	RECEIVE.	LEFT TT- 55/MGC	J-5D—J-17
SEND....	RECEIVE.	LEFT TT- 55/MGC	J-5E—J-17
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5A—J-17
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5A—J-13
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5B—J-17
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5B—J-13
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5B—J-18
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5B—J-14
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5C—J-18
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5C—J-14
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5D—J-15
RECEIVE.	SEND....	RIGHT TT- 55/MGC	J-5E—J-15
OFF....	OFF.....	PUNCH TAPE	J-11A—J-14
OFF....	OFF.....	PUNCH TAPE	J-14—J-12
OFF....	OFF.....	PUNCH TAPE	J-13—J-11B
OFF....	OFF.....	PUNCH TAPE	J-5A—B-5B
OFF....	OFF.....	PUNCH TAPE	J-5D—J-5E

Note. Jacks J-9, J-10, J-12, J-13, J-14, J-15, J-16, J-17, and J-18 are the shorting type. The sleeve and pin contacts are normally common (connected to each other).

131. Cord Resistances

The resistance of cords used in Radio Set AN/GRC-26 is less than 1 ohm in all cases except Cord CG-389/U which will indicate infinite resistance. (Cord CG-389/U contains an integral series capacitor.)

132. Signal Substitution Notes

The defective component or defective stage can often be located by substituting a signal of

the type that is normal to the input of the component or stage.

a. Signal substitution requires a source of audio, i-f, r-f, and d-c teletypewriter signals.

b. In addition, a headset such as Headset HS-30-(*) or a loudspeaker such as Loudspeaker LS-3, and both a good transmitting teletypewriter signal source and a good printing, or printing and perforating unit, are necessary.

c. A tube tester and Test Unit I-176 (included in Radio Set AN/GRC-26) are needed to isolate the defective part after the faulty stage has been located by signal substitution.

d. Note the receiver volume, and listen for serious distortion from the loudspeaker or headset at the various points in the signal substitution procedure (par. 67, TM 11-850). When working back from the output to the input stages, decrease the output of the signal generator as much as possible. If possible, compare with the other Receiver R-336/GRC-26 when it is known that the other receiver is in good condition.

e. Check the wiring and soldering in each stage during the procedure.

f. Do not remove the shield can of a tuned unit until the trouble has definitely been traced to that particular unit. Do not damage the wiring by pushing it back and forth during inspection. Be careful not to damage the component being worked on in any other way.

g. Misalignment in one or more stages will cause reduced output. Misalignment of an oscillator may prevent any output.

h. When trouble is localized in a given stage, first test the tube, if such a test is indicated, then measure the voltage (current of teletypewriter series circuits), and finally measure the resistance at the tube socket of that stage.

i. Trouble in a circuit may not cause changes in voltage or resistance measurements at the tube socket. The instructions included in this paragraph are merely a guide and should suggest other procedures, such as voltage and resistance measurements on individual parts.

j. Remove only one tube at a time when testing. Check the number of the tube, test the tube, and if it is not defective, return it to its proper socket before another tube is removed. If no tube checker is available, replace tubes one at a time until the set operates.

Section III. REPAIRS

133. Replacement of Parts

a. RADIOTELETYPEWRITER CONTROL C-535/GRC-26. Connectors, jacks, binding posts, and switches are accessible and can be replaced if found to be faulty. When removing defective parts, carefully mark disconnected wires with tags or other means to avoid misconnections when the new part is installed. This procedure is particularly important when the rotary switches are replaced. Do not use too much solder or allow drops of solder to fall into the

unit, since they may cause short circuits.

b. OTHER COMPONENTS. For replacement of parts in components other than Radioteletypewriter Control C-535/GRC-26, follow instructions given in individual equipment technical manuals.

134. Refinishing

Instructions for refinishing badly marred panels on exterior cabinets are given in TM 9-2851. Also see paragraph 80.

Section IV. ALIGNMENT PROCEDURES

135. General

Complete alignment and adjustment instructions for components of Radio Set AN/GRC-26 are given in individual equipment technical manuals (app. I). Test instruments required for alignment procedures are listed in the applicable manuals.

136. Radio Receiver R-336/GRC-26

For alignment of Radio Receiver R-336/GRC-26, follow the procedure for Radio Receiver BC-342-N described in TM 11-850.

137. Radio Transmitter T-213/GRC-26

For adjustment and neutralization of Radio Transmitter T-213/GRC-26, use instructions

for Radio Transmitter BC-610-(*) as covered in TM 11-281, TM 11-4057, and TB SIG 220.

138. Radioteletype Equipment

Alignment procedures for Frequency Shift Exciter O-39(*)/TRA-7, Dual Diversity Converter CV-31(*)/TRA-7, and Control Unit C-292(*)/TRA-7 are described in TM 11-278.

139. Teletypewriter Equipment

Adjustment of Teletypewriter TT-55/MGC is the same as for Teletypewriter TG-7-B described in TM 11-352. Perforator-Transmitter TT-56/MGC adjustment is covered in TM 11-2223 for the perforator and in TM 11-2222 for the transmitter-distributor.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

140. Disassembly

The following instructions are recommended as a guide for preparing the radio set for transportation and storage.

a. Disconnect any outside field lines. Disconnect power cord to Power Unit PE-95-G.

b. Roll up power cords and stow in shelter.

c. Take down doublet antennas, if used; disconnect coaxial cables. Repack antennas and replace cables on the reels provided.

d. Dismantle whip antennas and remove mast bases. Wrap the latter and place in wall cabinet. Place mast sections in cabinet compartment.

e. Disconnect grounding braid, and stow braid and ground rod in shelter.

f. Remove coils and tuning unit from transmitter. Stow in compartment of wall cabinet.

g. Cover teletypewriters, perforator, and transmitter-distributor with canvas cover provided. Install S-hooks on carriage to prevent shifting.

h. See that all components are securely mounted and that snubbers are tightly fastened.

i. Remove fluorescent lamps from fixtures, wrap for protection, and stow within shelter. Be careful that none of the fluorescent powder from broken lamps enters cuts or breaks in the skin. It is a dangerous compound.

j. Stow all loose items such as headset, key, and technical manuals in compartments of wall cabinet.

k. Remove time stamp from bench, wrap thoroughly, and stow in bench compartment.

l. Pack empty spaces in cabinet to prevent shifting of contents. Close and lock cabinet doors.

m. Close all windows, roof-hatch, and feed-through holes in shelter.

n. Stow coaxial cables and reels, antenna mast equipment, power cables, and Reel RL-31 in shelter to prevent their loss in the event the trailer becomes separated from the shelter. Secure all these components to prevent shifting during transportation.

141. Repacking for Shipment or Limited Storage

a. The exact procedure in repacking for shipment or limited storage depends on the material available and the conditions under which the equipment is to be shipped or stored.

b. In addition to steps given in paragraph 140, place protective wrappings around the heater, fire extinguisher, and other unprotected components.

c. Bags of silica gel should be placed inside the shelter and cabinets to act as a dehydrating agent.

d. Brace and shore-up interior of shelter if required material is available. Refer to figure 6 for method of packing.

e. Close and lock shelter door. Close and secure blackout shields over the closed windows and skylight. Tape two lance poles together and fasten within the upper brackets of one side of the shelter. Fasten the remaining two poles on the other side of the shelter. Seal door, windows, roof-hatch, and feed-through holes with waterproof sealing tape and sealing compound.

f. For packing Power Unit PE-95-G, refer to TM 11-904.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

142. General

The demolition procedures outlined in paragraph 143 will be used to prevent the enemy

from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon order of the commander.

143. Methods of Destruction

a. SMASH. Smash the meters, plugs, tubes, tuning controls, capacitors, crystals, resistors, sockets, insulators, microphones, headsets, typing units, teletypewriter motors, bases, keyboards, covers, transmitter-distributor, typewriters, relays, transformers, connectors, and antenna gear, using sledges, axes, hand-axes, pickaxes, hammers, crowbars, or heavy tools.

b. CUT. Cut cords, cables, guys, and hal-

yards, using axes, handaxes, or machetes.

c. BURN. Burn circuit labels, technical manuals, papers, and records, using gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. BEND. Bend panels and cabinet chassis.

e. EXPLOSIVES. If explosives are necessary, use firearms, grenades, or TNT.

f. DISPOSAL. Bury or scatter the destroyed parts in slit trenches, fox holes, or other holes, or throw them into streams.

g. DESTROY. Destroy everything.

APPENDIX I

REFERENCES

Note. For availability of items listed, check SR 310-20-3 and SR 310-20-4. Check Department of the Army Supply Catalog SIG 1 for Signal Corps supply catalog pamphlets.

I. Army Regulations

AR 380-5 Safeguarding Military Information.

2. Supply Publications

SIG 1 Introduction and Index.
SIG 3 List of Items for Troop Issue.
SB 11-6 Dry Battery Supply Data.
SB 11-47 Preparation and Submission of Requisitions for Signal Corps Supplies.
SB 11-76 Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

3. Technical Manuals on Related and Auxiliary Equipment and Test Equipment

TM 11-278 Frequency Shift Exciters O-39/TRA-7 and O-39A/TRA-7, Dual Diversity Converters CV-31/TRA-7 and CV-31A/TRA-7, and Control Units C-292/TRA-7 and C-292A/TRA-7.
TM 11-281 Radio Sets SCR-399-A and SCR-499-A.
TM 11-300 Frequency Meter Sets SCR-211-(*).
TM 11-321 Test Set I-56-E.
TM 11-333 Telephones EE-8, EE-8-A, and EE-8-B.
TM 11-352 Printer TG-7-A and Teletypewriters TG-7-B and TG-37-B.
TM 11-359 Line Unit BE-77, BE-77-A, BE-77-B, and BE-77-C.
TM 11-472 Repair and Calibration of Electrical Measuring Instruments.
TM 11-850 Radio Receivers BC-312-A, -C, -D, -E, -F, -G, -J, -L, -M, -N, -HX, and -NX; BC-342-A, -C, -D, -F, -J, -L, -M, and -N; BC-314-C, -D, -E, -F, and -G; and BC-344, and -D.
TM 11-904 Power Units PE-95-A, -B, -C, -F, -G, and -H.
TM 11-957 Rectifier RA-87.
TM 11-2201 Reperforator Teletypewriter Sets TC-16 and TC-17.
TM 11-2208 Test Set TS-2/TG and TS-2A/TG (Teletypewriter Signal Distortion).
TM 11-2217 Distortion Test Set TS-383/GG and TS-383A/GG.
TM 11-2222 Transmitter Distributors Teletype Model 14.
TM 11-2223 Typing and Nontyping Reperforators, Teletype Model 14.
TM 11-2613 Voltohmmeter I-166.
TM 11-2626 Test Unit I-176.
TM 11-2627 Tube Tester I-177 and I-177-A.
TM 11-4057 Radio Transmitters BC-610-A, -B, -C, -D, -E, and -F, Repair Instructions.
TM 11-5500 Multimeter TS-297/U.

4. Painting, Preserving, and Lubrication

TB SIG 13 Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 69 Lubrication of Ground Signal Equipment.
TM 9-2851 Painting Instructions for Field Use.

5. Camouflage

TM 5-20 Camouflage, Basic Principles.

6. Decontamination

TM 3-220 Decontamination.

7. Demolition

FM 5-25 Explosives and Demolitions.

8. Packaging and Packing Instructions

a. JOINT ARMY-NAVY PACKAGING SPECIFICATIONS.

JAN-D-169 Desiccants, Activated.

JAN-P-100 General Specifications.

JAN-P-106A Boxes, Wood, Nailed.

JAN-P-116 Preservation, Methods of.

JAN-P-125 Barrier Materials, Waterproof, Flexible.

JAN-P-131 Barrier Material, Moisture-Vaporproof, Flexible.

JAN-P-658 Packaging and Packing of Electrical Equipment and Spare Parts (electronic, electrical, and electro-mechanical).

b. U. S. ARMY SPECIFICATION.

100-2E Marking Shipments by Contractors (and Signal Corps Supplement thereto).

c. SIGNAL CORPS INSTRUCTIONS.

720-7 Standard Pack.

726-15 Interior Marking.

9. Other Publications

FM 24-18 Field Radio Techniques.

FM 72-20 Jungle Warfare.

SR 310-20-3 Index of Training Publications (Field Manuals, Training Circulars, Firing Tables and Charts, Army Training Programs, Mobilization Training Programs, Graphic Training Aids, Joint-Army-Navy-Air Force Publications, and Combined Communications Board Publications).

SR 310-20-4 Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, Tables of Equipment, and Tables of Basic Allowances.

TB SIG 4 Methods for Improving the Effectiveness of Jungle Radio Communication.

TB SIG 5 Defense against Radio Jamming.

TB SIG 25 Preventive Maintenance of Power Cords.

TB SIG 66 Winter Maintenance of Signal Equipment.

TB SIG 72 Tropical Maintenance of Ground Signal Equipment.

TB SIG 75 Desert Maintenance of Ground Signal Equipment.

TB SIG 123 Preventive Maintenance Practices for Ground Signal Equipment.

TB SIG 178 Preventive Maintenance Guide for Radio Communication Equipment.

TB SIG 220 Radio Transmitter BC-610-F.

TB 11-300-3 Rectifier Power Unit RA-133 and RA-133-A.

TM 1-455 Electrical Fundamentals.

TM 9-2857 Storage Batteries Lead-Acid Type.

TM 11-310 Schematic Diagrams for Maintenance of Ground Radio Communication Sets.

TM 11-314 Antennas and Antenna Systems.

- TM 11-415 Dry Batteries.
 TM 11-430 Batteries for Signal Communication. Except those pertaining to Aircraft.
 TM 11-453 Shop Work.
 TM 11-455 Radio Fundamentals.
 TM 11-466 Radar Electronic Fundamentals.
 TM 11-483 Suppression of Radio Noises.
 TM 11-486 Electrical Communication Systems Engineering.
 TM 11-496 Training Text and Applicatory Exercises for Amplitude-Modulated Radio Sets.
 TM 11-499 Radio Propagation.
 TB 11-499-()* Basic Radio Propagation Predictions.
 TM 11-660 Introduction to Electronics.
 TM 11-680 Teletypewriter Circuits and Equipment (Fundamentals).
 TM 11-4000 Trouble Shooting and Repair of Radio Equipment.
 TM 38-650 Basic Maintenance Manual.

*A new TB in this series is issued monthly which gives propagation predictions three months in advance.

10. Abbreviations

ac, AC	alternating current
adj, ADJ	adjustment, adjust
agc	automatic gain control
ALT	alternate
a-m	amplitude-modulated
amp, A	ampere
AMP, AMPL	amplifier
ANT	antenna
avc, AVC	automatic volume control
AWG	American Wire Guage
bfo, BFO	beat-frequency oscillator
C	Centigrade
cad	cadmium
CHAN	channel
CHK	check
c/o	consists of
coef	coefficient
COMP	compensator
cond	conductor
cont	contact
cps	cycles per second
ctr	center
cu in.	cubic inch
c-w	continuous-wave
cyc	cycle
d	deep
db	decibel
d-c	direct-current
diam	diameter
dimen	dimension
DOUB	doubler
dwg	drawing
DX	duplex

E	enameled
ea	each
EMERG	emergency
EXT	extension
f-m	frequency-modulated
freq	frequency
FS	frequency shift
ft	foot
GA	go ahead
gals	gallons
galv	galvanized
gnd	ground
h	high
hdw	hardware
hex	hexagon
h-f	high-frequency
HS	hermetically sealed
h-v	high-voltage
ID	internal diameter
i-f	intermediate-frequency
impr	impregnated
in.	inch
incl	including
INT	intermediate
kc	kilocycle
kw	kilowatt
kva	kilovolt-ampere
(lambda)	wavelength in meters
lb	pound
lg	long
LP	low pass
LUF	lowest usable frequency
ma	milliampere
max	maximum
mc	megacycle

meg, MEG	megohm	SLC	straight line capacity
MFP	moisture-fungusproof	spec	specification
MIC	microphone	SSE	single silk enameled
min	minimum	str	stranded
mm	millimeter	TD	transmitter-distributor
MO	master oscillator	term	terminal
ms	millisecond	thd	thread
mtg	mounting	thk	thick
mtg/c	mounting centers	tol	tolerance
mts	mounts	TT, TTY	teletypewriter
MUF	maximum usable frequency	uf, UF	microfarad
MVC	manual volume control	UHF	ultra high frequency
mw	milliwatt	uuf, UUF	micromicrofarad
NORM	normal	v, V	volt
o/a	over-all	vdcw	direct current working volts
OD	outside diameter	VOL	volume
opm	operations per minute	w, W	watt
OSC	oscillator	w/	with
oz	ounces	wd	wide
PA	power amplifier	wnd	wound, winding
pl	plated	w/o	without
psi	pounds per square inch	wpm	words per minute
qt	quart	xmtr	transmitter
REC	receiver	XTAL	crystal
r-f	radio-frequency	yd	yard
rpm	revolutions per minute		
RTT	radioteletype		
sect	section		
SIG	signal		
SIG C	Signal Corps		

12. Glossary

For explanation of the terms used in this manual, refer to TM 1-455 and TM 11-680.

APPENDIX II

IDENTIFICATION TABLE OF PARTS

Note. The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as T/O&E, T/A, T/BA, SIG 7-8-10, SIG 10, list of allowances of expendable materials, or another authorized supply basis. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1, Introduction and Index.

I. Identification Table of Parts for Radio Set AN/GRC-26

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
Fig. 1	RADIO SET: Army-Navy Radio Set AN/GRC-26(); AM, CW, radioteletype (freq shift); xmtr output 400 w cw, 300 w voice; xmtr freq range 2-18 mc; rec 1.5-18 mc; power output, 120 v AC, 50-60 cyc; single phase; 5.0 kw max; includes Radio Transmitter T-213/GRC-26, Speech Amplifier BC-614-H, Antenna Tuning Unit BC-939-A, radioteletype equipment, Perforator-Transmitter TT-56/MGC, Teletypewriter TT-55/MGC, two Radio Receivers R-336/GRC-26, Power Unit PE-95-G, in trailer; accessories include Line Unit BE-77-A, Rectifier RA-87, Tool Equipments TE-113, TE-50, Frequency Meter BC-221, Radioteletypewriter Control C-535()/GRC-26, Typewriter MX-322/U, interconnecting cords, antenna equipment, operators' chairs, storage cabinets, and operating supplies; installed and operated in Shelter S-55/GRC; o/a dimen 145" x 81½" x 79½"; radio set may be mounted on 2½ ton 6 x 6 cargo truck; U. S. Army spec 71-3334.	Provides facilities for transmission and reception of frequency shift radioteletype signals by means of half-duplex, full-duplex, and one-way reversible operation over a range of 2 to 18 mc. (Reception is on a dual space diversity basis.)	252501-26
Fig. 3	ADAPTER KIT, mast base: Sig C Adapter Kit M-459; ceramic insulators, metal hdw, rubber washers; c/o 2-piece porcelain insulator w/steel grounding ring, 3" lg tinned copper braid, Sig C Plug PL-259, binding post, rubber washers and other hdw; 5¾" h x 3½" diam o/a; B&W part #26-155; Sig C dwg #SC-D-20719-A.	Insulated mounting for Mast Base MP-65 (receiving antennas).	
	AMPLIFIER, AF: Sig C Speech Amplifier BC-614-(); 0.5 w output rating; freq response ±1 db; 200-3000 cps; 16½" lg x 9¾" d x 9½" h including shock mount; input 115 v, 60 cps single ph; approx 0.4 amp; input impedance 200 ohms, 1 meg; output impedance 500 ohms; metal cabinet; includes set of spare tubes; U. S. Army spec 71-1683-A.	Raises microphone output for voice modulation of transmitter.	2C252-7
	BRACKET: holds Telephone EE-8; "T" shape; CRS ivory enamel finish; 10½" x 8" x 4¼"; mts by three #10 RH wood screws ½" from ea of three ends; B&W dwg #WS-B-4001; Sig C dwg #SC-C-28020.	Holds Telephones EE-8.....	
	BRACKET: Army-Navy Bracket MT-657()/GRC; mast base support; rectangular shape; CRS painted OD; 10" x 10" x 8½" o/a; mts by four ¾" diam holes on 8¾" x 6¼" ctr; B&W part #26-508; Sig C dwg #SC-D-27961.	Bracket for Mast Base MP-47-A.	
	BROOM: flat, floor, sweeping; corn bristles; 60" lg x 10" wd x 2½" thk o/a; dimen; 16" lg bristles; set in twisted steel wire; Sears #11F06606.	Sweeps shelter.....	
	BRUSH, cleaning: oblong; hair bristles; bristle area 8" lg 3¼" wd x ½" thk x 14" o/a; bristle length 2¾"; bristles glued into wood; Dietzgen #4211A.	For dusting operating benches..	
	CABINET: Army-Navy Case CY-825/GRC-26; steel, treated, black wrinkle finish; 19½" wd x 17½" d x 20½" h o/a; includes raceways (bolted in place) to support Dual Diversity Converter CV-31()TRA-7; no handles; 6 shock-mounts on bottom; B&W dwg #S-26-513D.	Case for Dual Diversity Converter CV-31()/TRA-7.	
	CABINET: Army-Navy Case CY-826/GRC-26; steel, treated, black wrinkle finish; 19½" wd x 12½" d x 11	Case for Control Unit C-292()/TRA-7.	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	27/32" h o/a; fitted w/raceways to support Control Unit C-292()/TRA-7; no handles; ventilating holes in top; 4 shockmounts on bottom; Sig C dwg #SC-D-28002.		
	CABINET: Army-Navy Case CY-827/GRC-26; steel, treated, black wrinkle finish; 19" wd x 16 $\frac{3}{8}$ " d x 12 $\frac{5}{8}$ " h o/a; fitted w/raceways to support Frequency Shift Exciter O-39()/TRA-7; no handles; 4 shockmounts on bottom; pocket on right side to hold calibration book; Sig C dwg #SC-D-28023.	Case for Frequency Shift Exciter O-39()/TRA-7.	
W-2	CABLE, power: single #8 AWG stranded cond; rubber insulated; jacket heavy twine braid, black lacquered; 600 v working; round, 0.285" OD o/a; Packard #8 type #60.	Electric power feeders for shelter.	1B3008-1.3
	CABLE ASSEMBLY, power: Army-Navy Power Cable Assembly CX-1165/U (12 ft); underwriters type S; two #6 AWG cond; 600 v working; (12 ft lg excluding terminations); Crouse-Hinds #BP8732 male connector one end, two Burnaby #YAV4C-12 lugs other end; Sig C dwg #SC-D-22669-A.	Connects Power Cable Assembly CX-1166/U to shelter (power extension).	3E6000-1165.1
W-3	CABLE ASSEMBLY, power: Army-Navy Power Cable Assembly CX-1166/U (50 ft); underwriters type S, two #6 AWG stranded cond, 600 v working; (50 ft lg excluding terminations); Crouse-Hinds #BP8732 male connector one end, Crouse-Hinds #BRM70732 female connector other end; Sig C dwg #SC-D-22672-A.	Connects power unit to shelter or to Power Cable Assembly CX-1165/U.	3E6000-1166.1
W-5	CABLE ASSEMBLY, special purpose: Sig C Cord CD-267; 46" lg excluding term; Sig C Plug PL-6S on ea end; Sig C dwg #SC-D-5386-E.	Connects Control Box C-345A/ MRC-2 and Loudspeaker LS-3.	3E1267
W-6	CABLE ASSEMBLY, special purpose: Sig C Cord CD-605; 2 tinsel cond; ea cond c/o 12 bronze wires, rolled into ribbon of 4.45 mils ea; cotton serving and RI on ea cond; 400 v working; cotton filler, rubber compound jacket; round, 0.270" OD; 6 ft 6" lg excluding term; Sig C Plug PL-55 one end, Sig C Transformer C-410 other end; Sig C dwg #SC-A-7999, U. S. Army spec 71-1525-A.	Cord for Headset HS-30.....	3E1605-6.5
W-8	CABLE ASSEMBLY, special purpose: Army-Navy Special Purpose Cable Assembly CX-1120/U (2 ft 6" excluding terminations); Amphenol #AN-3108-14S-7S, 3 cont female connector w/AN-3057-6 clamp; Sig C Plug PL-55 other end; Sig C dwg #SC-D-22489-A.	Connects Perforator-Transmitter TT-56()/MGC and Radioteletypewriter Control C-535/GRC-26.	3E6000-1120.1
W-9	CABLE ASSEMBLY, special purpose: Army-Navy Special Purpose Assembly CX-1150/U (13 ft 6"); four #22 AWG cond; 16 #34 AWG strands; Buna S insulated; color-coded black, white, red, and green; 600 v working; round, 0.315" OD; Amphenol #AN-3108-14S-2P, 4 cont male connector w/AN-3057-6 clamp one end, Amphenol #AN-3108-14S-2S, 4 cont female connector w/AN-3057-6 clamp other end; Sig C dwg #SC-D-22675-A.	Connects Dual Diversity Converter CV-31()/TRA-7 and Radioteletypewriter Control C-535/GRC-26.	3E6000-1150.1
W-10	CABLE ASSEMBLY, special purpose: Army-Navy Special Purpose Assembly CX-1151/U (13 ft 6"); four #22 AWG cond; 16 #34 AWG strands, Buna S insulated; color-coded black, white, red, and green; 600 v working; round, 0.315" OD; Amphenol #AN-3108-14S-5P, 5 cont male connector w/AN-3057-6 clamp one end, Amphenol #AN-3108-14S-5S, 5 cont female connector w/AN-3057-6 clamp other end; Sig C dwg #SC-D-22835-A.	Connects Dual Diversity Converter CV-31()/TRA-7 and Radioteletypewriter Control C-535/GRC-26.	3E6000-1151.1
W-11	CABLE ASSEMBLY, special purpose: Army-Navy Special Purpose Assembly CX-1152/U (4 ft 6"); Amphenol #AN-3108-14S-7S, 3 cont female connector w/AN-3057-6 clamp one end, Amphenol #08M, 8 cont male connector other end; Sig C dwg #SC-D-22630-A.	Connects Speech Amplifier BC-614-() and Radioteletypewriter control C-535/GRC-26.	3E6000-1152.1
	CAPACITOR, fixed: paper; 100,000 uuf; 500 v AC/DC working; HS metal case; 1 $\frac{1}{2}$ " lg x 1" diam case, mineral oil impr	Suppresses interference from fluorescent lights.	

K-1	and filled; one 23/32" h x 1/2" diam phenolic/neoprene term w/3 1/2" lg insulated stranded #20 AWG wire; free end stripped and tinned 3/4"; internally grounded; has 5/8" wd x 1/16" thk wrap-around bracket w/9/32" mtg hole on 7/8" extension from bottom; suppresses interference within freq range of 1.5 to 38.9 mc; Sig C Capacitor CA-488 modified by addition of wire connection; U. S. Army spec 71-1667.		
	CASE: Army-Navy Case CY-689/GRC-26; plywood; 15 7/16" lg x 19 15/16" wd x 22 1/8" h; 3 3/4" lg slot for hand grip; Sig C dwg #SC-D-28022-A.	Bin for teletypewriter tape.....	
	CEMENT, liquid: household, general purpose; 1 3/4" oz metal tube; transparent, waterproof; Duco.	General paper cementing.....	
	CHAIR: tubular steel legs, leatherette covered plywood seat and back; w/o arms; 33 3/4" h x 19" d x 14 3/4" wd; McElroy type #OPC.	Operator's chair.....	
	CHAIR: wood, folding; w/o arms; 33 5/8" x 17 1/2" x 2 1/4" folded; Peabody Seating Co. #92.	Operator's chair.....	
	CIRCUIT BREAKER: thermal; 2 pole; 20 amp, 115 v AC; metal case; 5 7/8" h x 3 1/8" wd x 2 1/8" d; manual reset; wall mtg, 2 1/4" diam holes and 2 1/16" lg slotted holes on 2 3/4" x 4" mtg/c; Square D type M, #131722S.	Electric power protective device and load center.	3H900-20-18
	CLAMP: cable; steel; cad pl; one screw used; 27/32" lg x 1/2" wd x 5/32" h; Minerelec #Jiffy 105.	Secures rubber-covered cable (1/4" OD).	
	CLAMP: cable; malleable iron; cad pl; two screws; 1" lg x 1 1/8" wd x 1" h; for 3/8" to 1/2" cable; Appleton #7286.	Secures a-c power cords.....	
	CLAMP: cable; steel; galv; two screws; 1" h x 5/8" wd x 1 1/8" lg; for 1/2" cable; reversible; GE #SP7050.	Secures a-c power cords to lighting fixtures.	
	CLAMP: cable; steel; galv; one screw; 2" lg x 3/4" wd x 7/8" h; for 1/2" conduit; GE #SP4176.	Secures conduit to shelter wall.	
S-1	CLAMP: cable; steel; cad pl; one screw used; 1 1/8" lg x 5/8" wd x 3/8" h; for 3/8" OD cable; Minerelec #Jiffy 375.	Secures cables to shelter wall....	
	CLAMP: cable; steel; cad pl; one screw; 1 1/8" lg x 1/2" wd x 1 1/8" h; for 3/4" cable; Tinnerman Prod #C-2980S-12.	Secures shelter cable.....	
	CLIP: chart; black enameled steel; 3/8" wd x 1" h x 1/2" diam opening; 2 1/2" max jaw opening; WECO #5B.	Holds messages and other papers on shelter wall.	6Z1941
	CLIP, paper: wire construction; 2 1/2".....	Stationery clip.....	
	CLIP, paper: wire construction; 1 3/8".....	Stationery clip.....	
	CLIPBOARD: composition back w/metal clip; 9" x 12 1/2"; U. S. Navy spec 53-F-3.	Holds messages and papers....	6M226
	CLOCK: aircraft; wall mounting style; 1 7/8" diam dial; body 2-9/32" diam; has two #18 holes on 1 1/16" rad for mtg; luminous hands and numbers; Longines-Wittnauer type #A11.	Indicates time.....	6Z1958
	CLOTH, textile: cheesecloth, bleached, lintless; 16.3 yd per lb; 36" wd x 3 linear yd lg; B&W #41 Fed spec CC-C-271 #II, class B.	Cleaning and maintenance of equipment.	
	COMPASS, magnetic: moving needle; 0-360 deg in raised metal ring w/zero point at North position; aluminum case w/black wrinkle finish; 4" x 3 1/2" x 3/4" o/a dimen; unmounted, hand carried; brass bearing; K&ECo #5600 1/2.	Positioning doublet antenna masts.	6Z2203
	CONDUIT: electro-galv iron; 1/2" size; flexible; thin wall....	Wire duct for shelter a-c power system.	
S-2	CONNECTOR, female contact: 2 curved oblong cont; straight; approx 3 5/8" lg x 1.468" wd x 1.156" h o/a; 20 amp, 240 v; cylindrical, black bakelite body; 2 metal mtg ears w/3/16" x 5/16" slots on 3.281" mtg/c; Hubbell #7210.	A-c power receptacle for Radio Transmitter T-213/GRC-26.	
	CONNECTOR, female contact: 2 round cont; straight; 4 3/8" max diam x 2 1/8" h; 30 amp; 250 v AC; round metal body; hard rubber insert; 4 mtg holes on 4" diam; includes cap, chain, and gasket; Crouse-Hinds #QE8302 w/BR302.	A-c power receptacle for shelter.	
S-3	CONNECTOR, female contact: 2 sets of 3 curved female cont; straight; approx 3 5/8" lg x 1.328" wd x 1.25" h o/a;	Radioteletype equipment groundable receptacle.	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
S-4	10 amp, 250 v; oblong, black bakelite body; 2 metal mtg ears w/ $\frac{3}{16}$ " x $\frac{5}{16}$ " slots on 3.281" mtg/c; Hubbell Twist-Lock #7580.		
	CONNECTOR, female contact: 4 T-slot cont; straight; approx 4" lg x 1.328" wd x 1.125" h o/a; 10 amp, 250 v; 15 amp, 125 v; oblong black bakelite body; 2 metal mtg ears w/slots on 3.281" mtg/c; Hubbell #9595.	General appliance a-c power receptacle.	
	CONNECTOR, solderless: adj type; copper alloy, natural finish; for #10 AWG solid wire copper; 23/32" lg x $\frac{7}{16}$ " wd x 19/64" thk o/a; w/ $\frac{5}{16}$ " diam; #28 thd x $\frac{7}{16}$ " lg thd portion having 3/32" wd x $\frac{1}{2}$ " lg slot diametrically down its length; w/hex nut and captive tongue for securing cond; mechanically connects to wire; Burndy type #KS-90.	Jumper connectors on doublet antenna wire.	6Z191-5
Fig. 2	CONTAINER: formed sheet steel; OD finish; 5 galv cap; inflammable liquid; square shape; 13 $\frac{7}{8}$ " x 17 $\frac{3}{4}$ " x 6 $\frac{1}{2}$ " o/a dimen; closed top, w/thd cap secured by chain; formed steel handle; QM stk #42-D-1280; Ord dwg #08917-Z.	Holds gasoline for power unit...	
	CONTROL UNIT, radio receiver: Army-Navy Control Box C-345A/MRC-2; receiver volume control; contains 2 ea Sig C Jacks JK-33 and JK-34; 2 ea 5000 ohm, 4w potentiometers w/knobs; 2 ea 18" lg; 2 cond #18 AWG RC cordage terminated in Sig C Plug PL-68; steel, black wrinkle finish; 6" lg x 3 $\frac{1}{2}$ " wd x 2" d; four mtg holes for #8 wood screw; marked VOLUME, REC. A, REC. B, Phones, Speaker; B&W dwg #WS-B-4002; Sig C spec #71-3238.	Controls volume of Radio Receivers R-336/GRC-26.	2C666-345
	CONTROL UNIT, radio set: Army-Navy Radioteletype-writer Control C-535/GRC-26; switches functions of teletypewriters and provides connections for radio and teletype components of Radio Set AN/GRC-26; steel, black semi-gloss finish; 12" lg x 7" h x 3 $\frac{3}{4}$ " d o/a; 4 holes 0.187" diam on 5 $\frac{1}{4}$ " x 6 $\frac{1}{2}$ " ctr; U. S. Army spec #71-3334.	Junction and switching box for radio and teletypewriter equipment.	2C6401
	COVER: cover for feed-thru hole in shelter; cad pl malleable iron; 4" max diam x 3" h o/a; four $\frac{3}{16}$ " mtg holes on 3 $\frac{3}{16}$ " diam ctr; Appleton #18081.	Protection and waterproof cover for cable entrances.	
	COVER: Sig C Cover BG-198; OD cotton duck; 18 $\frac{1}{2}$ " wd x 21 $\frac{3}{8}$ " d x 15 $\frac{1}{8}$ " h; includes 4 sets of straps for fastening; Sig C dwg #SC-D-19826-A.	Covers for Teletypewriters TT-55/MGC, spare printer.	2Z3400-198
	COVER: Sig C Cover BG-199; OD cotton duck; 17 $\frac{5}{8}$ " wd x 21 $\frac{3}{4}$ " d x 13 $\frac{1}{8}$ " h; includes 4 sets of straps for fastening; Sig C dwg #SC-D-19828-A.	Cover for perforator of Perforator-Transmitter TT-56/MGC.	4TFPR/1
	COVER: Sig C Cover BG-200; OD cotton duck; 9" wd x 17 $\frac{1}{2}$ " d x 10 $\frac{1}{4}$ " h; includes 4 sets of straps for fastening; Sig C dwg #SC-D-19830-A.	Cover for transmitter-distributor of Perforator-Transmitter TT-56/MGC.	4TXD/1
	COVER: outlet box, for 1 receptacle; galv steel; 4 $\frac{1}{4}$ " lg x 2 $\frac{1}{4}$ " wd x $\frac{3}{16}$ " h; mts on GE#SP5800 outlet box, one $\frac{1}{4}$ " hole in ctr; GE #SP58R5.	Protection cover for single gang receptacle.	
	COVER: for two duplex flush receptacles; galv steel; rectangular; 4" x 4" x $\frac{1}{2}$ "; mts on 4" square outlet box; Appleton #8371.	Two-gang duplex receptacle cover.	
	ERASER: typewriter; rubber w/fiber brush; round eraser; 1 $\frac{1}{2}$ " diam x $\frac{3}{16}$ " thk; Fed spec ZZ-E-661a, type C.	Stationery.....	
	FITTING, conduit: conduit bushing; galv malleable iron; $\frac{1}{2}$ " size; thd connection; GE #SP122.	Prevents wire abrasion from conduit ends.	
	FITTING, conduit: conduit bushing; laminated bakelite; $\frac{1}{2}$ " size; thd connection; Appleton type #EBS, #29121.	Prevents wire abrasion from conduit ends.	
	FITTING, conduit: conduit bushing; galv malleable iron; 1" size; thd connection; Appleton #8032.	Prevents wire abrasion from conduit ends.	
	FITTING, conduit: conduit bushing; galv malleable iron; $\frac{3}{4}$ " size; thd connection; Appleton #8031.	Prevents wire abrasion from conduit ends.	
	FITTING, conduit: conduit connector; galv steel; $\frac{1}{2}$ " size; thd connection; GE #4271.	Secures conduit to boxes.....	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	FITTING, conduit: conduit coupling; galv malleable iron; $\frac{1}{2}$ " size; thd connection; includes galv steel locknut; watertight; GE #SP2550.	Conduit coupling.....	
	FITTING, conduit: conduit locknut; galv steel; $\frac{1}{2}$ " size; GE #SP141.	Conduit securing hardware.....	
	FITTING, conduit: conduit locknut; cad pl steel; $\frac{3}{4}$ " size; Appleton #BL-75.	Conduit hardware.....	
	FITTING, conduit: conduit nipple; cad pl steel; $\frac{1}{2}$ " diam x $1\frac{1}{2}$ " lg; thd connection.	Wire duct.....	
	FITTING, conduit: conduit nipple; cad pl steel; $\frac{1}{2}$ " diam x 3" lg; thd connection.	Wire duct.....	
	FITTING, conduit: conduit nipple, galv malleable iron; $\frac{3}{4}$ " diam x 3" lg; thd connection.	Wire duct.....	
	FITTING, conduit: conduit nipple; galv malleable iron; 1" size; thd connection; Appleton #7203.	Wire duct.....	
	FIXTURE, lighting: ceiling type; 110-125 v; approx 25" lg x $2\frac{1}{2}$ " wd x 2" h; painted ivory; reflector type; one socket; for one 24" lg 20 w tube; Levolier #21 pull switch; Graybar #120CH.	Shelter lighting.....	
	FIXTURE, lighting: ceiling type; 110-125 v; approx 25" lg x 5" wd x 2" h; painted ivory; reflector type; one socket; for two 24" lg 20 w tubes; Levolier #21 pull switch; Graybar #220CH.	Shelter lighting.....	
	FUSE, cartridge: $\frac{1}{4}$ amp; 250 v; one time; glass body; ferrule term; $1\frac{1}{4}$ " lg x $\frac{1}{4}$ " diam; Littelfuse #312.250.	For teletypewriters.....	
	FUSE, cartridge: 5 amp, 250 v; one time; glass body; ferrule term; $1\frac{1}{4}$ " lg x $\frac{1}{4}$ " diam; Littelfuse #3AG, 1358.	For teletypewriters.....	
	FUSE, cartridge: 15 amp; 250 v; one time; fibre body; ferrule term; nonindicating; 2" lg x $\frac{1}{16}$ " diam; Bussman #25015.	For Rectifier RA-87.....	
	GUY: c/o 10 ft lg end 1 ft lg of Sig C Rope RP-3 separated by 1 insulator JAN type NS4B5224, spec JAN-I-8; 11 ft 3" lg o/a; Sig C dwg #SC-B-28061-A.	Hold-down guy for receiving whip antennas.	
	GUY: c/o 10 ft lg and 1 ft lg of Sig C Rope RP-3 separated by 1 insulator JAN type NS3B5240, spec JAN-I-8; 11 ft 5" lg o/a; Sig C dwg #WC-B-28062-A.	Hold-down guy for transmitting whip antennas.	
	HAMMER, hand: sledge, two face; 6 lb; drop forged steel w/polished faces; seasoned hickory handle, smooth grip, 34" lg o/a; two hardwood wedges; Plumb #6.	Drives stakes into ground.....	
	HARDWARE KIT: for general repairs; various finishes, materials, and assortment of standard hdw.	Hardware replacement in equipment.	
	HEATER, air: electric; $12\frac{1}{4}$ " h x $8\frac{1}{2}$ " wd x $7\frac{5}{8}$ " d; 115 v 60 cyc AC, single phase; cast aluminum grid w/fins; 1500 w; cradle mtd, secured w/4 wing fasteners to heater, cradle mtg four $\frac{1}{4}$ " x $1\frac{1}{2}$ " lg Parker-Kalon screws; Elec Air Htr #AAT-15.	Heats shelter.....	
	INSULATOR, bowl: round; white steatite, grade L-3 per JAN spec JAN-I-10; 2-23/32" h; $5\frac{1}{4}$ " diam, $\frac{5}{16}$ " diam hole in ctr, six $\frac{5}{16}$ " mtg holes on $4\frac{1}{16}$ " ctr on flange; American Lava Co Type #A9232.	Transmitting antenna lead-in wire feedthru insulator.	3G90-11
	INSULATOR, strain: cylindrical; JAN type NS4B5224; JAN spec JAN-I-8; grade L5, finish white glazed; 4" o/a $\frac{3}{4}$ " diam; holes $\frac{3}{8}$ " on 3" mtg/c.	Long wire antenna insulator.....	3G3552-24
	JUNCTION BOX: outlet box; for $\frac{1}{2}$ " conduit; electro-galv iron; w/o cover; rectangular 4" lg x $2\frac{1}{8}$ " wd x $1\frac{1}{8}$ " d; 3 knockouts ea side, 1 ea end, 1 in bottom; GE #SP5800.	Supports electrical box receptacles.	
	JUNCTION BOX: outlet box; for $\frac{1}{2}$ " conduit; galv steel; w/o cover; square, 4" x 4" x $1\frac{1}{2}$ "; 3 knockouts in ea side, 5 in bottom; GE #SP52151 (1/2).	Supports a-c power receptacles.	
	KEY, telegraph: Sig C Key J-45; manual; $5\frac{5}{8}$ " lg x $4\frac{1}{2}$ " wd x 6" h o/a (w/knee clip); 2 silver cont 5/32" and $\frac{3}{16}$ " diam; steel lever, black nickel finish; 3 way adj; bakelite oval base	Manual keying.....	3Z3445

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
W-12	<p>3" lg x 2" wd; 2 knurled head brass binding posts; U. S. Army spec 71-721-A.</p> <p>LAMP, fluorescent: 20 w, 110-125 v, 60 cyc; bulb T-12, white; 24" lg, 2 cont twist-lock ends; burn any position.</p> <p>LAMP, incandescent: 115-125 v, 15 w; bulb T-7 clear; 2$\frac{5}{8}$" lg o/a; intermediate screw base; C-1 filament; burn any position; Mazda #15T7N.</p>	<p>Shelter lighting.....</p> <p>Spares for teletypewriters.....</p>	6Z6871-1
W-12	<p>LEAD, electrical: #7 AWG copper braid; 10 ft lg excluding terminations; has special lug per B&W dwg #WS-A-4024-1 on ea end; B&W dwg #WS-A-4024, 1" wd x 0.040" thk flat.</p> <p>LIGHT, extension: trouble light; SJ cable; 25 ft lg cord Underwriters #V-259; 2 parallel blades rubber body plug; 50 w size, wire guard and reflector; hanging hook 1$\frac{3}{4}$" h; includes 120 v, 50 w; Graybar #2560.</p>	External ground for shelter	3E3100-120
W-13	LINE, RF transmission: Army-Navy Pick-up Antenna AT-137/MRC-2 (4 ft); 48" lg excluding term; one end skinned w/leads 2" lg and gnd clamp soldered 12" frqm end; other end skinned 1 $\frac{1}{2}$ " w/11 $\frac{1}{2}$ " lg of #14 AWG bus-bar soldered to braid shield; B&W dwg #26-516B.	Connects Frequency Meter BC-221 and Exciter O-39()/TRA-7.	
W-14	LINE, RF transmission: Army-Navy Cord CG-67/MRQ-2 (5 ft 6" excluding term) 5 ft 9" lg o/a; Sig C Plug PL-259 ea end; Sig C dwg #SC-D-16258-A.	Connects Mast Base MP-65 and Radio Receiver R-336()/GRC-26.	1F430.67.60.6
W-15	LINE, RF transmission: Army-Navy RF Cable Assembly CG-557/U (75 ft excluding term) 75 ft 8" lg o/a; Sig C Plug PL-259 one end; B&W coaxial connector type #CC-51 other end; Sig C dwg #SC-D-22840-A.	R-f transmission line (transmitting antenna).	3E6015-557.1
W-16	LINE, RF transmission: Army-Navy RF Cable Assembly CG-557/U (500 ft excluding term); Army-Navy Cable RG-11/U; 500 ft 8" lg o/a; Sig C Plug PL-259 one end; B&W coaxial connector type #CC-51 other end; Sig C dwg #SC-D-22840-A.	R-f transmission line (receiving antenna).	3E6015-557.2
W-17	<p>LINE, RF transmission: Army-Navy RF Cable Assembly CG-558/U (2 ft 3" excluding term); 2 ft 7" lg o/a; Sig C Plug PL-259 one end; two term Pat-MacGuyer #3003-10 other end; Sig C dwg #SC-D-22837-A.</p> <p>MAST, antenna support: Army-Navy Mast AB-155/U; includes antenna components; steel mast; 40 ft assembled.</p>	<p>Connects Radio Transmitter T-213/GRC-26 and Antenna Tuning Unit BC-939-A.</p> <p>Doublet antenna support.....</p>	3E6015-558.1
	<p>METER, multimeter: Sig C Test Unit I-176; portable; AC v: 0-5/25/100/250/1000, 1000 ohms per v; DC v: 0-5/25/100/250/1000, 1000 ohms per v; 0-5/25/100/250/1000/5000, 20,000 ohms per v; AC current: 0-0.5/1.0/5/10 amp; DC current: 0-50 ua, 0-1/10/100/500 ma, 0-1/5 amp; ohms: 0-1000/100,000/10 meg; 50 ua meter arranged to give 20,000 ohm per v and 1000 ohm per v sensitivity; 4$\frac{1}{4}$" x 4" rectangular meter; wood case, 11$\frac{1}{2}$" wd x 8$\frac{1}{2}$" d x 5$\frac{1}{2}$" h w/carrying handle; includes test leads and clips; U. S. Army spec 71-1767 w/Amend #1.</p>	Tests measurements.....	2A2065-155
	<p>MICROPHONE, dynamic: Sig C Microphone T-50; impedance 21,000 ohms; output level 15 db below 1 mw into 600 ohms at normal speaking distance (0 db = 1 volt/bar); freq response 900 to 3500 cps; unidirectional; 4" lg x 2$\frac{1}{4}$" wd x 2" d; includes 6 ft log cable terminated w/Amphenol #MC3M connector; Electro-Voice type #600C.</p>	High-impedance microphone for voice operation.	2B1650
	OIL, lubricating: universal; 3 oz can.....	General lubrication.....	
	PAPER, bond: general typewriting; 8 $\frac{1}{2}$ " x 10 $\frac{1}{2}$ "; white #1 sulphite; packed in reams.	Typewriter paper.....	
	PAPER, recording: 8 $\frac{1}{2}$ " wd, 4 $\frac{1}{2}$ " diam roll; canary yellow; fiber roll; Fed spec UU-P-547a, type 1.	Paper for teletypewriters.....	
	PAPER, recording: 8 $\frac{1}{2}$ " wd x 350 ft lg; canary yellow; W/2 carbon inserts; fiber roll.	Paper for teletypewriters.....	
	PENCIL: Sig C Pencil M-139; indelible; black, medium; wood, painted purple; 7" lg.	Writing.....	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	PENCIL: Sig C Pencil M-140; general purpose; black #2 lead; wood; $7\frac{1}{2}$ " lg.	Writing.....	
	PERFORATOR-TRANSMITTER: Army-Navy Perforator-Transmitter TT-56()/MGC; standard commercial type arrangement w/P ϕ ; 5 unit code; wiring per Teletype dwg #WD-2282-A; $\frac{1}{16}$ " wd paper tape, Chadless punch; approx 24" lg x 18" wd x 18" h o/a; mts on 4 rubber shock mounts on 12" x 9" mtg ctr; remote stop on H key; c/o Sig C Re-perforator-Transmitter TG-26-A, modified for noise suppression.	Punches and prints message tapes; transmits and retransmits tape messages.	4TTT56
	POLE, lance: spruce, painted OD; 11 ft 5" lg o/a; $2\frac{1}{2}$ " lg pointed bottom; includes $1\frac{5}{8}$ " wd aluminum collar around head.	Doublet antenna support.....	5A3211
	POWER SUPPLY: Sig C Rectifier Power Unit RA-133-A; electronic type; output 5.0-6.6 v, 1.00 amp; 121.5-135 v, 0.02 amp; input 110-130 v or 220-260 v, 50-60 cyc AC; $8\frac{3}{4}$ " wd x $5\frac{3}{8}$ " h x 6" d o/a; includes JAN-6X5GT rectifier tube; full-wave rectifier; includes filter; four 0.209" diam mtg holes on $4\frac{1}{2}$ " x $5\frac{3}{8}$ " mtg/c; U. S. Army spec 71-3177.	A-c power supply for Frequency Meter BC-221.	3H4691-133
	RACK: Army-Navy Rack MT-655/GRC; wood and steel construction; 17" lg x $7\frac{1}{2}$ " wd x 2" h; cotton webbing strap to hold reel in place; Sig C dwg #SC-C-27979-A.	Rack for Reel DR-4.....	2Z7383-655
	RACK: Army-Navy Rack MT-656/GRC; holds six 5 gal gasoline cans; hardwood; $44\frac{1}{8}$ " lg x $15\frac{3}{4}$ " wd x 17" h; divided by vertical partitions into 6 equal compartments; six cotton webbing straps to hold gasoline cans in place; Sig C dwg #SC-D-27974-A.	Rack for gasoline cans.....	
	RADIOTELETYPE EQUIPMENT: transportable; freq shift radioteletype (FM); 2-18 mc w/Radio Set AN/GRC-26; 115 v 50/60 cyc AC; includes Army-Navy Frequency Shift Exciter O-39()/TRA-7, Control Unit C-292()/TRA-7, Dual Diversity Converter CV-31()/TRA-7, Rectifier Power Unit PP-193()/TRA-7, Oscillator O-41()/TRA-7 and tools and interconnecting cables; normally installed in shelter or other oper position, operates w/standard Army-Navy receivers and transmitter to provide freq shift transmission and reception, the latter on a dual space diversity basis; U. S. Army spec 71-3276-A.	Provides radioteletype operation when used with standard Army-Navy transmitter, receivers, and teletypewriters.	2S5006-7
	RECEIVER, radio: Army-Navy Radio Receiver R-336()/GRC-26; AM, CW; communication; freq range 1.5-18 mc in 6 bands; input 110-120 v, 60 cyc AC, 75 w; shock mounted steel cabinet; 18" wd x $10\frac{3}{4}$ " d x $9\frac{1}{4}$ " h; 11 tube superheterodyne circuit; includes 1 set of spare tubes and fuses; c/o Radio Receiver BC-342-N modified to improve freq stability for use w/Dual Diversity Converter CV-31()/TRA-7; U. S. Army spec 71-3334.	Reception of cw, mcw, and voice (a-m) radio signals.	2C4180-336
	ROD, ground: steel, cad pl; 4 ft 6" lg x $\frac{1}{2}$ " diam; cone point; bolt and wing nut assem; adapted for use w/ground braid having spade lug; B&W part #26, dwg #WS-A-4029.	Grounding rod for shelter.....	2Z8051-44
	ROPE: Sig C Rope RP-3; cotton; braided; $\frac{3}{16}$ " diam, #6; white; 180 lb; U. S. Army spec 71-217-A.	General tying and fastening.....	
	SHELL, connector: c/o connector shell w/cap, gasket, and chain; steel, cad pl; cylindrical; $4\frac{3}{8}$ " max diam x $1\frac{5}{16}$ " h; Crouse-Hinds housing, gasket, cap and chain assembly for QE-8302 receptacle.	Feedthru in shelter wall.....	
	SHELTER: Army-Navy Shelter S-55/GRC; radio equipment; assembled; rectangular w/bowed roof; wood framework, plywood inner lining, steel outside wall panels, canvas roof covering and steel underflooring, Thermal insulation throughout; 6 windows $14\frac{1}{4}$ " wd x $12\frac{3}{8}$ " h approx; 1 door 34" wd x $59\frac{1}{2}$ " h w/window $24\frac{1}{2}$ " wd x 17" h; 1 roof	Houses all components except power unit.	3Z7702-55

Ref. symbol	Name of part and description	Function of part	Signal Corps Stock No.
	hatch 25 $\frac{1}{4}$ " x 22 $\frac{7}{8}$ "; includes ventilating blower, and fire extinguisher; has blackout shutters and screens, table and shelves for equipment, storage cabinet; U. S. Army spec 72-144.		
	SOLDER: Sig C Solder M-31; general purpose; soft 38/62 tin-lead; w/resin core; commercial grade WW, wire shape; round, min diam 0.086", max 0.102" diam, 1 lb spool; U. S. Army spec 71-332-D.	Maintenance soldering	
	SPOUT: flexible tubing, steel, galv; 16 $\frac{1}{4}$ " lg x 1 $\frac{1}{8}$ " ID tubing; 1 $\frac{3}{8}$ " diam coupling to mate container; lever expands coupling for tight fit to container; B&W #25-4; QM stk #42-T-13575; Ord dwg #09153W.	Facilitates pouring gasoline from drum.	
	STAMP, time: Sig C Stamp MC-181-A; steel, black wrinkle finish; 6 $\frac{3}{4}$ " wd x 6 $\frac{1}{4}$ " d x 10 $\frac{1}{2}$ " h; prints the words; Message Center-month, date, year, and time on 24 hour basis.	Time recorder for messages	6M1211A
	STARTER, fluorescent lamp: aluminum body; 20 w; 1 $\frac{1}{2}$ " lg x $\frac{3}{4}$ " diam; mts in fluorescent lamp fixture; GE type #FS-2.	Starters for shelter lighting fixtures.	6Z8378
	STRAP, retaining; OD cotton webbing; 10" lg x 1" wd x $\frac{1}{8}$ " thk o/a; 1 end terminated w/North and Judd #1130-1" Bronze Tabler Buckle, other end w/North & Judd #149-1" and clip; mildew-proofed and water repellent; Sig C dwg #SC-D-19825, group 1.	Holds folding chair	6Z8567
	STRAP, retaining: OD cotton webbing; buckle section — 41" lg x 1 $\frac{1}{2}$ " wd x $\frac{1}{8}$ " thk; Tip section — 15" lg x 1 $\frac{1}{2}$ " wd x $\frac{1}{8}$ " thk; Buckle section—one end terminated w/double bar tongueless steel black finished buckle 1 $\frac{1}{4}$ " wd x 1 $\frac{1}{2}$ " lg, other end terminated w/footman loop standard for strap wd 1 $\frac{1}{8}$ "; Tip section—one end terminated w/brass tip 1 $\frac{1}{4}$ " wd x $\frac{3}{4}$ " lg, other end terminated w/footman loop standard for strap wd 1 $\frac{1}{2}$ "; impregnated for tropical use; B&W #25-1; Sig C dwg #SC-C-27983 (Buckle section); Sig C dwg #SC-C-27984 (Tip section).	Holds Mast AB-155/U to Trailer K-52.	2A3362-1
	STRAP, retaining: OD cotton webbing; 18" lg x 1 $\frac{1}{2}$ " wd x $\frac{1}{8}$ " thk; one end terminated w/double bar tongueless steel black finish buckle 1 $\frac{1}{4}$ " wd x 1 $\frac{1}{2}$ " lg; other end terminated w/brass tip 1 $\frac{1}{4}$ " wd x $\frac{3}{4}$ " lg; impregnated for tropical use; B&W #26-136; Sig C dwg #SC-C-27982 Grp II.	Holds lance poles to Shelter S-55/GRC.	
	STRAP, retaining: OD cotton webbing; 17 $\frac{1}{8}$ " lg x 1 $\frac{1}{2}$ " wd x $\frac{1}{8}$ " thk; one end terminated w/double bar tongueless steel black finish buckle 1 $\frac{1}{4}$ " wd x 1 $\frac{1}{2}$ " lg, other end terminated w/brass tip 1 $\frac{1}{4}$ " wd x $\frac{3}{4}$ " lg; footman loop, standard, for strap wd 1 $\frac{1}{2}$ ", steel black finished, stitched near buckle end for strap mtg; impregnated for tropical use; B&W #25-2; Sig C dwg #SC-C-27985.	Holds Reel Unit RL-31 to Trailer K-52.	
	STRAP, retaining: OD cotton webbing; 6 $\frac{3}{4}$ " lg x 1 $\frac{1}{2}$ " wd x $\frac{1}{8}$ " thk; ea end terminated w/brass tip 1 $\frac{1}{4}$ " wd x $\frac{3}{4}$ " lg and one lift Dot fastener w/clinch plate installed near one end; impr for tropical use; B&W #26-135; Sig C dwg #SC-B-27964.	Holds broom and hammer	2A3362-2
	TAPE, insulating: Sig C Tape TL-83; cotton friction; adhesive; $\frac{3}{4}$ " wd 0.015" thk, black; $\frac{1}{2}$ lb roll; 1000 v dielectric test; approx 82 ft per roll; Fed spec #HH-T-101, grade A.	Maintenance repairs	
	TAPE, insulating: Sig C Tape TL-192; two ply synthetic rubber-like compound exclusive of reclaimed or reused rubber; adhesive; $\frac{3}{4}$ " wd, 0.045" thk, w/white unvulcanized compound approx 0.030" thk and vulcanized compound approx 0.015" thk; 3 $\frac{3}{4}$ " diam roll; 15 ft per roll; Fed spec #HH-T-111.	Maintenance repairs	
	TAPE, measuring: steel; 100 ft lg; case 4 $\frac{3}{8}$ " diam x $\frac{3}{4}$ " thk	Antenna wire construction	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	o/a; graduated in tenths of inch; tape $\frac{3}{8}$ " wd; steel case OD finish; rustproof; Lufkin #246D.		
	TELETYPEWRITER: Army-Navy Teletypewriter TT-55 ()/MGC; portable; standard commercial keyboard w/P ϕ ; English characters; 72 characters per line; sending and receiving; friction feed; 110 v AC, 50/60 cyc series governed motor geared for 368 opm; 5-unit code; for wire or radio circuits; Teletype Model #15 Printer; remote stop on "H" key; c/o TG-7-B Sig C Teletypewriter modified for noise suppression; U. S. Army spec 71-3334.	Receives and transmits teletypewriter messages.	4TTT55
	TERMINAL, lug: straight type, round end; tinned copper; for max #8 B&S gage wire; $1\frac{3}{4}$ " lg x $\frac{3}{8}$ " wd w/13/64" stud hole; solder connects to wire; Penn Union standard size $\frac{1}{4}$.	Terminations, a-c power feeders.	
	TOOL KIT: Sig C Tool equipment TE-50; black composition case w/carrying handle; o/a dimen $19\frac{1}{2}$ " x $13\frac{1}{2}$ " x 6"; Sig C Case CS-78; Carrying Case CS-78 per U. S. Army spec 71-1041-A.	Repair and maintenance or teletypewriter equipment.	6R38050
	TOOL KIT: Sig C Tool Equipment TE-113; steel chest OD finish, $21\frac{1}{2}$ " lg x $8\frac{1}{2}$ " wd x $7\frac{5}{8}$ " h w/loose tray; Sig C Chest CH-77; stencil marking; Tool Equipment TE-113.	Repair and maintenance of radio equipment.	6R38113
	TRANSMITTER, radio: Army-Navy Radio Transmitter T-213()/GRC-26; AM, CW; freq range 2-18 mc; output 400 w CW, 300 w voice; input 115 v 50/60 cyc; mtd on shock mounted base bolted to floor of shelter; o/a dimen 30" x 31" x 45"; xtal or MO controlled (no xtals furnished); includes 14 coil units (7 spare), 24 tuning units, 1 set of spare tubes and fuses; c/o Radio Transmitter BC-610-F modified as follows: slotted hole w/rubber grommet provided on front panel to accommodate Cord CG-389/U; Sig C Socket SO-239 installed on left side panel to accommodate Cord CG-557/U/RF transmission line; ceramic feed-thru insulators removed, furnished w/transmitter; U. S. Army spec 71-3334.	Transmission of frequency shift, cw, voice signals.	2C6900-213
	TUBING: steel, galv; single duct; $1\frac{5}{8}$ " ID; flexible; one end plain, other end terminated w/nominal $1\frac{1}{4}$ " diam pipe coupling secured by cotter pin; 10 ft coil lg; std $1\frac{1}{4}$ " pipe coupling included for attachment to power unit muffler; B&W #25-5; Ord dwg #09153W.	Exhaust tube for power unit	
	TUNING UNIT, RF: Sig C Antenna Tuning Unit BC-939-(); includes variable loading coil, coupling coil, 0-15 amp RF meter, vacuum capacitor; steel, painted black; $11\frac{1}{4}$ " lg x $23\frac{1}{2}$ " d x $14\frac{1}{2}$ " h; mts on top of Radio Transmitter T-213()/GRC-26 by means of 3 rubber shock mounts on 9" x $6\frac{1}{2}$ " ctr; U. S. Army spec 71-1683-A.	Couples transmitter output to 15-foot whip or long wire antenna.	2C527-939
	TYPEWRITER: Sig C Typewriter MX-322/U; portable; telegrapher's keyboard; gothic 12 points; $12\frac{1}{2}$ " carriage; black or gray wrinkle finish; includes black leather covered carrying case; $\frac{1}{2}$ " wide ribbon; automatic reverse 2-color ribbon control; fixed impression; margin release; back spacer; LC #Clipper.	Types messages	6M1800
	TYPING UNIT: page printer; 5-unit code; friction feed; standard commercial characters w/P ϕ ; Murray style type pallet arrangement #97 w/72 characters per line; accommodates eight $\frac{1}{2}$ " wd paper; wiring arrangement per Teletype dwg #WD2143; approx $15\frac{1}{2}$ " lg x 14" wd x 12" h o/a; c/o pulling magnet selector mechanism, printing mechanism w/moving type basket, function mechanism w/signal bell on figure H, motor stop mechanism; mts on Teletype Base #BB44; nonautomatic carriage return and line feed in ltr and figures position does not print on H, does not include	Spare teletypewriter typing unit.	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	blank selection type bar or ribbon spool retainers, cast alloy black E frame; Teletype part #BP22/97.		
	WASHER: steel, galv; round $\frac{7}{8}$ " ID, $2\frac{3}{16}$ " OD x 1/32" thk (reducing washer); Thomas & Betts #3706.	Conduit hardware.....	
	WASHER: steel, galv; round $1\frac{1}{16}$ " ID, $2\frac{3}{16}$ " OD x 1/32" thk (reducing washer); Thomas & Betts #3707.	Conduit hardware.....	
	WIRE, electrical: Sig C Wire W-1; bare; single #14 AWG cond; tinned copper; stranded (7 strands #24 AWG).	Doublet antenna wire.....	1A1
	WIRE, electrical: Army-Navy Wire WD-1/TT ($\frac{1}{2}$ mile) in Army-Navy Wire Dispenser MX-306/G; separately insulated twisted pair; 2 round str and cond; equivalent to #23 AWG; ea cond c/o four soft drawn tinned copper strands and three galv steel strands, ea 0.011" diam; polyethylene insulation, extruded nylon jacket; 220 v working; sunlight, heat, cold, and humidity resistant; U. S. Army spec 71-3265.	Field wire for telephone and other wire lines.	1B190-1.4
	WRENCH: special pipe T shape, w/built in socket; hex socket $\frac{5}{16}$ " flats; 44" x $7\frac{1}{8}$ " x $\frac{1}{16}$ " o/a dimen, $\frac{1}{16}$ " OD tubing body; cold drawn seamless tubing; to fit over $\frac{3}{4}$ " hex bolt head; B&W #26-507; Sig C dwg #SC-C-28016.	For removing mounting bolts of transmitter.	6R57691

2. Identification Table of Parts for Shelter S-55/GRC

Name of part and description	Function of part	Signal Corps stock No.
SHELTER: Army-Navy Shelter S-55/GRC assembled; rectangular w/bowed roof 12 ft 1" x 6 ft 9 $\frac{1}{4}$ " x 6 ft 6" h; wood framework, plywood inner lining, steel outside wall panels, canvas roof covering and steel underflooring; Thermal insulation throughout; 6 windows 14 $\frac{1}{4}$ " wd x 12 $\frac{3}{8}$ " h approx; 1 door 34" wd x 59 $\frac{1}{2}$ " h w/window 24 $\frac{1}{2}$ " wd x 17" h; 1 roof hatch 25 $\frac{1}{4}$ " x 22 $\frac{7}{8}$ "; includes ventilating blower and fire extinguisher; has blackout shutters and screens, table and shelves for equipment, storage cabinet; U. S. Army spec 72-144.	Houses all components except power unit.	3Z7702-55
BLOWER: squirrel cage centrifugal; electric motor operated; 6" diam; nonportable; guarded; motor 1/6 hp, 1750 rpm, 60 cyc single phase 115 v AC, 2.5 amp; 13 $\frac{7}{8}$ " x 15" x 10 $\frac{7}{8}$ " o/a; 630 cfm at 1725 rpm; single speed, on-off toggle switch; direct drive; clockwise rotation, 6 $\frac{1}{4}$ " intake, 5" outlet; cast iron housing, painted olive drab; wall mounting, three $\frac{3}{8}$ " diam on 4 $\frac{3}{4}$ " x 5" mtg ctr; moisture-fungus proofed; U. S. Army spec 72-144.	Ventilates shelter.....	
BRACKET, holding: 3 slots for 3 different hatches; steel, olive drab finish; 10 $\frac{5}{8}$ " lg x $\frac{3}{4}$ " wd x $\frac{3}{8}$ " d (bent); 3 holes 0.180" diam, 5 $\frac{1}{2}$ " between two holes and 4" between other, $\frac{1}{4}$ " and 1" from ends; Excel Corp part #P-301947.	Holds hatch window props.....	
CATCH, fastener: steel, olive drab finish; 3" lg x $\frac{5}{8}$ " wd x $\frac{1}{4}$ " bend on one end; 2 holes, 0.180" diam to bottom of sleeve; American-Moninger part #509; Sig C dwg #SC-D-27951.	Receives and holds latch of external heater inlet door.	
CATCH, fastener: steel, olive drab finish; 1 $\frac{1}{2}$ " wd x 3" lg x 14" ga thk; two mtg holes 25/64" diam, 2 $\frac{1}{4}$ " mtg/c between holes; American-Moninger part #503.	Receives top latch of upper rear door.	
CATCH, fastener: steel, olive drab finish; 1 $\frac{1}{2}$ " wd x 3" lg x $\frac{1}{8}$ " thk; two mtg holes 25/64" diam, 2 $\frac{1}{4}$ " mtg/c between holes; American-Moninger part #505.	Receives bottom latch of upper rear door.	
CATCH, fastener: steel, olive drab finish; 1 $\frac{1}{2}$ " wd x 3" lg x $\frac{3}{8}$ " thk; two mounting holes 25/64" diam, 2 $\frac{1}{4}$ " mtg/c between holes; American-Moninger part #502.	Receives latch of lower rear door.	
CATCH, fastener: steel, painted ivory; 2 $\frac{1}{2}$ " wd x 3 $\frac{1}{2}$ " lg x 16" ga thk; two mtg holes, 2 $\frac{1}{2}$ " between ctr of ea; American-Moninger part #518.	Receives roof hatch fastener....	
CATCH, fastener: steel, olive drab finish; 2" wd x 6" lg x 11" ga thk; two mtg holes 25/64" diam, 5" mtg/c between holes; American-Moninger part #504-A.	Receives center latch of upper rear door.	

Name of part and description	Function of part	Signal Corps stock No.
CLAMP: holds guides, panel and end, at corners; steel; painted olive drab; two holes 0.177" diam ea; 2" lg x 2" wd x $\frac{5}{16}$ " end w/right angle; Excel Corp part #P-200509; Sig C dwg #SC-D-27952.	Holds guides at corners.....	
CLEANER, air: panel type; steel frame; 11 $\frac{1}{2}$ " x 12 $\frac{1}{2}$ " x $\frac{1}{2}$ "; replaceable; steel frame; steel screen filtering media; Air-Maze, Kleenflo, $\frac{1}{2}$ " thk; Sig C dwg #SC-D-15875.	Ventilator.....	
DOOR: includes lock and hinge; steel, olive drab finish; 7" wd x 7" lg x $\frac{3}{4}$ " d o/a; 4 holes 0.177" diam in hinge, 1 $\frac{3}{4}$ " apart; American-Moninger part #506; Sig C dwg #SC-D-27951.	Door for external heater inlet..	
DUCT: sheet steel, painted ivory; single exhaust, w/damper; 5"; standard 18" ga min; Sig C dwg #SC-D-15874.	Exhaust duct of blower.....	
EXTINGUISHER, fire: carbon dioxide; trigger operation; 4 lb capacity; weight 14 lb 14 oz fully charged; 18 $\frac{1}{2}$ " h x 4 $\frac{1}{2}$ " wd x 12 $\frac{3}{4}$ " d; 15 ft range; steel cylinder, red enamel finish; Randolph Labs type "4," Model C; JAN spec JAN-E-468.	Extinguishes fires.....	
FASTENER, latch: van door lock (right-hand) upper rear door; steel, olive drab finish; upper rod—19 $\frac{5}{8}$ " lg x $\frac{3}{4}$ " wd x $\frac{1}{4}$ " thk; lower rod—8 $\frac{5}{8}$ " lg x $\frac{3}{4}$ " wd x $\frac{1}{4}$ " thk; center base—7 $\frac{7}{8}$ " lg x 4-9/32" wd; slide bolt case—3" lg x 3 $\frac{1}{4}$ " wd; slide bolt—1 $\frac{1}{2}$ " wd x $\frac{3}{4}$ " thk; one HANDLE—7" lg (outside); mtd to inside of upper rear door; fastens to three catches by movement of one handle; American-Moninger part #515.	Fastens upper rear door (inside)	
FRAME, assembly: steel, olive drab finish; 8 $\frac{5}{8}$ " x 8 $\frac{5}{8}$ " x $\frac{1}{4}$ " d; 14 holes, 0.177" diam, 2 $\frac{1}{2}$ " apart; American-Moninger part #507; Sig C dwg #SC-D-27951.	For external heater inlet.....	
GUARD: includes suction screen and frame 7 $\frac{15}{16}$ " diam x $\frac{1}{16}$ " thk; steel, 16 ga, olive drab hardware cloth 2 x 2 mesh for screen; 10 $\frac{1}{2}$ " lg x 5" wd x 11 $\frac{1}{2}$ " d o/a; 5" wd x 6 $\frac{1}{2}$ " h opening; to wall mtg bracket by 8 evenly spaced $\frac{1}{4}$ " diam holes, at opposite side to suction screen; ILG Elec Style #C-3; Sig C dwg #SC-D-15874.	To cover squirrel cage fan of blower.	
GUIDE, end: steel, olive drab finish; 8 $\frac{3}{4}$ " lg x $\frac{3}{4}$ " wd x $\frac{1}{2}$ " thk; Excel Corp part #P-301998; Sig C dwg #SC-D-27952.	End guide for blackout panel...	
GUIDE, end: steel, olive drab finish; 11" lg x $\frac{3}{4}$ " wd x 1 $\frac{1}{8}$ " thk; o/a five 0.177" diam holes, 2 $\frac{3}{8}$ " apart; Excel Corp part #P-301997; Sig C dwg #SC-D-27955.	Used to hold ventilator panel in closed position.	
GUIDE, end: steel, olive drab finish; 15 $\frac{1}{2}$ " lg x $\frac{3}{4}$ " thk o/a; 4 holes, 0.177" diam 4 $\frac{3}{4}$ " between holes mtd between RH and LH guides; Excel Corp part #P-301938; Sig C dwg #SC-D-27954.	End guide for blackout panel...	
GUIDE, end: steel, olive drab finish; 25 $\frac{5}{8}$ " lg x $\frac{3}{4}$ " wd x $\frac{3}{4}$ " thk o/a; six 0.177" diam holes, 5" apart—outside over window of door; Excel Corp part #P-301929; Sig C dwg #SC-D-27949.	End guide for blackout panel...	
GUIDE, panel: steel, olive drab finish; 17 $\frac{3}{4}$ " lg x $\frac{3}{4}$ " wd x $\frac{1}{2}$ " thk; 5 ea 0.177" diam holes, 2 $\frac{5}{8}$ " apart; Excel Corp part #P-301999; Sig C dwg #SC-D-27952.	Guide for blackout panel of external heater intake.	
GUIDE, panel: steel, olive drab finish; 26 $\frac{1}{4}$ " lg x $\frac{3}{4}$ " wd x 1 $\frac{1}{8}$ " thk o/a; 10 ea 0.177" diam holes, 2 $\frac{5}{8}$ " apart; Excel Corp part #P-301993; Sig C dwg #SC-D-27955.	Ventilator blackout panel (left-hand).	
GUIDE, panel: steel, olive drab finish; 26 $\frac{1}{4}$ " lg x $\frac{3}{4}$ " wd x 1 $\frac{1}{8}$ " thk o/a; 10 ea 0.177" diam holes, 2 $\frac{5}{8}$ " apart; Excel Corp part #P-301994; Sig C dwg #SC-D-27955.	Ventilator blackout panel (right-hand).	
GUIDE, panel: steel, olive drab finish; 32 $\frac{3}{4}$ " lg x $\frac{3}{4}$ " wd x $\frac{3}{4}$ " thk o/a; 7 holes, 0.177" diam 5" between ea hole; Excel Corp part #P-301945; Sig C dwg #SC-D-27954.	Blackout panel (window left-hand side).	
GUIDE, panel: steel, olive drab finish; 32 $\frac{3}{4}$ " lg x $\frac{3}{4}$ " wd x $\frac{3}{4}$ " thk o/a; 7 holes, 0.177" diam, 5" between ea hole; Excel Corp part #P-301946; Sig C dwg #SC-D-27954.	Blackout panel (window, right-hand side).	
GUIDE, panel: steel, olive drab finish; 39 $\frac{5}{8}$ " lg x $\frac{3}{4}$ " wd x $\frac{3}{4}$ " thk o/a; outside of door 8 ea 0.177" diam holes 5 $\frac{1}{4}$ " apart; Excel Corp part #P-301927; Sig C dwg #SC-D-27949.	Blackout panel (door, left-hand side).	
GUIDE, panel: steel, olive drab finish; 39 $\frac{5}{8}$ " lg x $\frac{3}{4}$ " wd x $\frac{3}{4}$ " thk o/a; outside of door 8 ea 0.177" diam holes; 5 $\frac{1}{4}$ " apart; Excel Corp part #P-301928; Sig C dwg #SC-D-27949.	Blackout panel (door, right-hand side).	

Name of part and description	Function of part	Signal Corps stock No.
GUIDE, screen: steel, olive drab finish; 48" lg x 3/4" wd x 1/2" thk; 9 holes, 0.177" diam, 5 3/4" between ea hole; Excel Corp part #P-301950.	Guide for screen of roof hatch	
HANDLE: malleable iron, olive drab finish; 5" lg x 2 1/8" wd x 1/2" thk; 1/2" diam hole at fastener end, for 1/2" diam bolt; Eberhard part #5809.	Lower rear door (inside)	
HANDLE: malleable iron, olive drab finish; 8" lg x 1 3/4" wd x 1 3/4" at opening; 3/4" grip, round, x 5" lg; mtd to inside of shelter on fastener, latch by means of two 5/8" diam cap point Allen-head set screws, 1/2" lg; American-Moninger part #516.	Upper rear door (inside)	
HINGE: CRS; olive drab finish; 60" lg x 4 1/2" wd (opened) x 2 1/4" wd (closed); nonremovable pin (brass, 1/4" diam); #12 FH wood screw, 60 holes; connected to upper and lower rear doors; American-Moninger part #501; Sig C dwg #SC-D-27960.	Piano hinge on door	
LOUVER: steel, olive drab finish; 11 3/4" x 12 7/8" x 3/4" bent flange; held in place by bent flange at top and bottom inside ventilator; inserted into position, louver openings facing up; American-Moninger part #512; Sig C dwg #SC-D-15875.	Inter-louver of ventilator	
LOUVER: steel, olive drab finish; 13 1/4" x 14 1/4"; contains mesh insect screen between 1st and 2d louvers which are welded back-to-back; American-Moninger part #511; Sig C dwg #SC-D-15875.	Outer louver of ventilator located inside of shelter.	
MOTOR, AC: repulsion induction type; 1/6 hp, 1725 RPM; closed frame type; temp rating; continuous; temp rise 55°C; moisture-fungus proofed; 9" lg x 6 1/2" wd x 7" h, 1/2" diam shaft; 115 v AC, 60 cyc, single phase, 2.5 amp; fixed mtg base; 4 holes 1/2" diam 3" apart at end 4 3/4" apart along side; GE part #5KH45AB1480; Sig C dwg #SC-D-15873 and #SC-D-15874.	Blower motor	
MOUNTING, bracket: heavy duty bracket; steel, painted red enamel; 9 1/2" h x 4 1/2" ID x 1/4" thk; 4 holes 5/8" diam bottom or back; can be mounted to wall or floor; Randolph Labs #22.	Holds fire extinguisher	
PAN, drip: 20 ga steel; rectangular; 1 3/16" wd x 12 7/8" lg x 1 3/8" h o/a; including lip and 3 ea 3/8" diam holes; flat lip, plain; American-Moninger part #514.	Allows rain water to drain from ventilator.	
PANEL, blackout: steel, olive drab finish; 9 1/2" lg x 8 1/2" wd x 1/4" thk; Excel Corp part #P-302001; Sig C dwg #SC-D-27952.	Blackout for external heater inlet.	
PANEL, blackout: steel, olive drab finish; 13" lg x 11 5/8" wd x 1/2" thk o/a; Excel Corp part #P-302002; Sig C dwg #SC-D-27955.	Blackout for ventilator	
PANEL, blackout: steel, olive drab finish; 15 7/8" x 16" x 1/2" thk o/a; Excel Corp part #P-301940; Sig C dwg #SC-D-27953.	Blackout for side windows	
PANEL, blackout: steel, olive drab finish; 23" lg x 20 1/2" wd x 1/4" thk o/a; mtd to sash, roof hatch by a hinge mounting; Excel Corp part #P-301967.	Blackout for roof hatch	
PANEL, blackout: steel, olive drab finish; 26" lg x 19 1/4" wd x 1/2" thk o/a; Excel Corp part #P-301931; Sig C dwg #SC-D-27950.	Blackout of rear door window	
PLATE, back: steel, olive drab finish; 9 1/2" lg x 1 1/4" wd x 1/4" thk; 3 holes, 1/2" diam 2 holes 3/4" from end, 1 1/8" apart; 1 hole 3/4" from other end; American-Moninger part #510; Sig C dwg #SC-D-15877.	Backing plate for hold-down assembly.	
SASH, roof hatch: frame, hinge, glass and two adjusting props; steel, olive drab finish; two panes ea 7/32" thk, shatterproof glass; 23 1/4" x 25 3/4" x 1 1/4" thk o/a; 9 holes, 0.177" diam on hinge 3" apart; Excel Corp part #P-301952; Sig C dwg #SC-D-27938-5.	Light and ventilation	
SASH, window: frame hinge glass and adj prop; steel, olive drab finish; two panes ea 7/32" thk shatterproof glass; 24" lg x 16 1/2" wd x 1 3/4" thk; 9 holes in hinge, 0.177" diam, 3" between ea hole; Excel Corp part #P-301922; Sig C dwg #SC-D-27948-23.	Light and ventilation through rear door.	
SCREEN, window: screen, 16 mesh, and frame, and mtd ctr brace from top to bottom w/opening for side window prop; steel, painted ivory; 14" lg x 12" wd x 1/4" thk o/a; 14 holes, 0.177" diam, 5" between outside holes, 2 3/4" between ctr holes; Excel Corp part #P-301892.	Screen assembly for windows (inside).	
SCREEN, window: screen, 16 mesh; steel, olive drab finish; includes mtd ctr brace from top to bottom w/opening for door window prop; 18 1/4" wd x 25 3/4" lg x 1/4" thk o/a; 14 holes, 0.177" diam, 7 1/2" between holes; Excel Corp part #P-301910; Sig C dwg #SC-D-27948-22.	Screen and frame for shelter door (inside).	

Name of part and description	Function of part	Signal Corps stock No.
SCREEN, window: screen, 16 mesh, and frame; steel, painted ivory; 23 $\frac{3}{4}$ " wd x 26 $\frac{1}{4}$ " lg x 1 $\frac{1}{4}$ " thk o/a; mtd between guides inside at ctr of ceiling for roof hatch; Excel Corp part #P-301951.	Screen and frame for roof hatch.	
SHUTTER, assembly: 3 shutter doors; steel, olive drab finish; 14 $\frac{1}{2}$ " wd x 13" x 1" o/a; shutter door 3 ea 12 $\frac{1}{4}$ " lg x 3 $\frac{1}{4}$ " wd; mtd by 8 holes, 0.177" diam, 6 $\frac{1}{4}$ " apart on cabinet doors, 2 connecting rods which enable all shuttered doors to open and close together; American-Moninger part #517; Sig C dwg #SC-D-15875.	Ventilation.....	
SLEEVE, lead: steel, olive drab finish; 2" lg x 5 $\frac{3}{4}$ " diam x 1 $\frac{1}{4}$ " thk o/a; mtd in lower rear door held by $\frac{1}{4}$ " lip all around one end and 2 holes 0.180" diam holding catch for lock of external heater inlet door; American-Moninger part #508; Sig C dwg #SC-D-27951.	Inlet for external heater.....	
SPRING, clip: flat type; steel, spring; $\frac{3}{8}$ " wd x 1 $\frac{3}{4}$ " lg x 24 ga thk; 2 ea $\frac{3}{8}$ " #6 RH sheet metal screws; American-Moninger part #513.	Holds filter in ventilator in place.	
TURNBUCKLE, assembly: 2 steel rods w/eyes, turnbuckle, hook, hinge, bracket, hold-down mtg bracket; steel, olive drab finish; 32 $\frac{1}{2}$ " compressed x 37 $\frac{1}{2}$ " extended lg o/a; turnbuckle 5 $\frac{1}{2}$ " lg x 1 $\frac{1}{4}$ " wd x $\frac{5}{8}$ " thk; upper rod—17 $\frac{1}{2}$ " lg x $\frac{1}{2}$ " thk; lower rod—6 $\frac{1}{2}$ " lg x $\frac{1}{2}$ " thk; hold-down hinger 3 $\frac{1}{8}$ " lg x 3" h x $\frac{1}{16}$ " diam hole for $\frac{1}{2}$ " x 5" bolt and nut; hold-down bracket 9 $\frac{1}{2}$ " lg x 1 $\frac{1}{2}$ " wd x $\frac{3}{8}$ " thk w/bolt and nut; Sig C dwg #SC-D-15877.	Holds down assembly of shelter to truck, adjustable.	
WINDOW: c/o frame, hinge, glass and adjusting prop; steel, olive drab finish; two panes ea, 7 $\frac{3}{8}$ " thk shatterproof glass; 13 $\frac{7}{8}$ " lg x 11 $\frac{7}{8}$ " wd x 1 $\frac{1}{8}$ " thk o/a; 5 holes on hinge, 0.177" diam, 3 $\frac{1}{2}$ " between ea hole; Excel Corp part #P-301903; Sig C dwg #SC-D-27938-3, #SC-D-27938-4.	Side window assembly, for light and ventilation.	

3. Identification Table for Parts for Radio Transmitter T-231/GRC-26

Note. For additional parts, see identification table of parts for Radio Transmitters BC-610-F and BC-610-G in, appendix II, TB SIG 220.

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER, radio: Army-Navy Radio Transmitter T-213()/GRC-26; freq range 2-18 mc; output 400 w CW, 300 w voice; input 115 v 50/60 cyc; mtd on shock-mounted base which is bolted to floor of shelter; o/a dimen 30" x 31" x 45" h; xtal or MO controlled (no xtals furnished); includes 14 coil units (7 spares), 24 tuning units, 1 set of spare tubes and fuses; c/o Radio Transmitter BC-610-F modified as follows: slotted hole w/rubber grommet provided on front panel to accommodate Cord CG-389/U; Sig C Socket SO-239 installed on left side panel to accommodate RF Cable Assembly CG-557/U RF transmission line: ceramic feed-thru insulators removed; furnished w/transmitter; U. S. Army spec 71-3334.	Transmission of frequency shift, cw, voice signals.	2C6900-213
SO-10	CONNECTOR, female contact: Sig C Socket SO-239; single round female cont; straight; 1" sq x 1 $\frac{1}{16}$ " lg o/a; 500 v peak, nonconstant impedance UHF type coax connector; cylindrical w/square mtg flange, die-cast zinc body silver pl; low-loss mica filled bakelite insert; four 0.125" diam mtg holes on 0.719" mtg/c; Amphenol #831R; Sig C dwg #SC-D-5850.	Receptacle for RF Cable Assembly CG-557/U, r-f transmission line.	
	GROMMET: rubber; fits $\frac{3}{4}$ " diam hole; $\frac{1}{2}$ " ID, $\frac{1}{16}$ " wd groove, $\frac{5}{8}$ " wd x 1 $\frac{1}{16}$ " diam o/a; Atlan India Rub type #2283; spec AN-G-21, type AN931-8-13.	Prevents abrasion of Cord GC-389/U.	

4. Identification Table of Parts for Radio Receiver R-336/GRC-26

Ref. symbol	Name of part and description	Function of part	Signal Corps Stock No.
	RECEIVER, radio: Army-Navy Radio Receiver R-336()/ GRC-26; AM, CW; communication; freq range 1.5-18 mc in 6 bands; input 110-120 v, 60 cyc AC, 75 w; shock-mounted steel cabinet; 18" wd x 10 $\frac{3}{4}$ " d x 9 $\frac{1}{4}$ " h; 11 tube superheterodyne circuit; includes 1 set of spare tubes and fuses; c/o Radio Receiver BC-342-N modified to improve freq stability for use w/Dual Diversity Converter CV-31() /TRA-7; U. S. Army spec 71-3334.	Reception of cw, mew, and voice (a-m) radio signals.	2C4180-336
	ARM: contact, copper, dull white nickel finish; 17/32" lg x $\frac{5}{16}$ " wd x 1/32" thk o/a; Sig C dwg #2566-M, item 28.	Crystal switch arm.....	
	BALL, bearing: steel; spherical; 7/32" diam; Sig C dwg #SC-D-2545, item 86.	Locks index ball.....	
	BOARD, terminal: 2 brass tin pl term; $\frac{5}{8}$ " between ctr of term; lam phenolic material; $\frac{3}{4}$ " lg x $\frac{1}{2}$ " h x $\frac{1}{4}$ " d o/a; 1 mtg hole 0.161" diam; Radio Essentials type #5201.	Acts as a support for screen grid voltage-dropping resistors R-63 and R-64.	
	BOARD, terminal: 3 solder lug term; bakelite; $\frac{3}{4}$ " h x 1 $\frac{1}{8}$ " wd x $\frac{3}{16}$ " thk o/a; Cinch #1520A.	Component mounting. (MWO Sig 11-850-3 to prevent leakage in AVC circuit.)	
	BOARD, terminal: 4 brass tin pl term; $\frac{7}{16}$ " distance between term; ceramic board; 1 $\frac{1}{16}$ " lg x 1 $\frac{1}{16}$ " d x $\frac{3}{4}$ " h; 1 mtg hole centrally located; 5/32" diam; Underwood Elec type #A-86.	Supports resistors and capacitors in r-f oscillator coil-capacitor assembly.	
	BOARD, terminal: 3 double-ended solder lugs mtd on board w/#6-32 screws; term $\frac{3}{8}$ " apart; glass bonded mica; grade I-4 per JAN-I-10; 1 $\frac{1}{16}$ " lg x $\frac{3}{8}$ " wd x $\frac{3}{4}$ " h; two mtg holes on $\frac{3}{8}$ " ctr; tapped for #6-32; B&W dwg #WE-A-3419-2.	Junction terminal board for leads between oscillator coil-capacitor assembly and oscillator tube socket.	
	BOARD, terminal: 9 solder lug term; phenolic; 3 $\frac{3}{8}$ " lg x $\frac{3}{4}$ " wd x $\frac{1}{16}$ " thk; Sig C dwg #SC-D-2570-J, items 5 and 37.	Component mounting.....	
	BOARD, terminal: 14 solder lug term; phenolic; 2 $\frac{5}{8}$ " lg x 1 $\frac{5}{8}$ " wd x $\frac{1}{16}$ " thk; includes two mtg brackets; Sig C dwg #SC-D-2570-J, items 2, 18, 3, and 36.	Component mounting.....	
	BOARD, terminal: 26 solder lug term; phenolic; 5 $\frac{1}{8}$ " lg x 1-17/32" wd x $\frac{1}{16}$ " thk; Sig C dwg #SC-D-2570-I, items 1, 18, and 13.	Component mounting.....	
	BRACKET L-shape; steel; 1.625" lg x 1.375" wd x $\frac{1}{16}$ " h o/a; Sig C dwg #SC-D-2535, item 7.	Mounting bracket for Socket SO-94.	
	BUTTON, plug: brass; fits $\frac{7}{16}$ " diam hole; 57/64" diam x 5/64" thk; United Carr #50668.	Part of fast tuning knob.....	
	CAP: cast aluminum alloy; 2 $\frac{5}{8}$ " h x 2-5/32" wd x 1-43/64" d; Sig C dwg #SC-D-2534, item 6.	Socket SO-94 cover.....	
C-114	CAPACITOR, fixed: ceramic; 5 uuf ± 0.25 uuf; negative temp coef 750 (tol ± 112) uuf/uF/ $^{\circ}$ C; 500 vdcw; 0.562" lg x 0.250" thk; axial wire term leads; Erie style K, N750.	Temperature compensating capacitor across h-f oscillator grid-to-ground circuit.	
C-112, C-118	CAPACITOR, fixed: ceramic; 6 uuf ± 0.25 uuf; negative temp coef 750 (tol ± 112) uuf/uF/ $^{\circ}$ C; 500 vdcw; 0.400" lg x 0.200" thk; radial wire term leads; uninsulated, Erie style A, N750.	C-112: Temperature compensating capacitor from injector grid to ground of 6L7. C-118: Temperature compensating control grid of 6J5 h-f oscillator tube.	
C-119	CAPACITOR, fixed: ceramic; 25 uuf $\pm 1\%$; negative temp coef 80 (tol ± 30) uuf/uF/ $^{\circ}$ C; 500 vdcw, 0.400" lg x 0.200" thk; radial wire term leads; uninsulated; Erie style A, N080.	Temperature compensating capacitor ingrid circuit of h-f oscillator 6J5.	
C-104	CAPACITOR, fixed: ceramic; 25 uuf $\pm 2\%$; negative temp coef 30 (tol ± 30) uuf/uF/ $^{\circ}$ C; 500 vdew; 0.656" lg x 0.200" thk; radial wire leads; term mtg; uninsulated; Erie style B, N030.	Temperature compensating capacitor across oscillator tuned circuit for 3,000 to 5,000-kc band.	
C-106, C-107	CAPACITOR, fixed: ceramic 25 uuf $\pm 2\%$; negative temp coef 30 (tol ± 30) uuf/uF/ $^{\circ}$ C; 500 vdew; 0.460" lg x 0.230" thk; radial wire leads; term mtg; uninsulated; Erie style T, N030.	C-106: 11- to 14-mc band, temperature compensating capacitor across oscillator tuned circuit.	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
C-105	CAPACITOR, fixed: ceramic 50 uuf $\pm 2\%$; negative temp coef 80 (tol ± 30) uuf/uF/ $^{\circ}\text{C}$; 500 vdcw; 0.460" lg x 0.230" thk; radial wire leads; term mtg; uninsulated; Erie style T, N080.	C-107: 14- to 18-mc band, temperature compensating capacitor across oscillator tuned circuit.	
C-40	CAPACITOR, fixed: ceramic; 100 uuf $\pm 1\%$; negative temp coef 30 (tol ± 30) uuf/uF/ $^{\circ}\text{C}$; 500 vdcw; 1.125" lg x 0.265" thk; radial wire leads, term leads; uninsulated; Erie style C, N030.	Temperature compensating capacitor across oscillator tuned circuit for 5- to 8-mc band.	
C-41	CAPACITOR, fixed: mica; JAN type CM20B050M; 5 uuf $\pm 20\%$; 500 vdcw; max body dimen 51/64" lg x 15/32" wd x 7/32" thk.	Temperature compensating capacitor part of tracking capacitor network of 6J5 h-f oscillator circuit.	
C-67	CAPACITOR, fixed: mica; JAN type CM20B100K; 10 uuf $\pm 10\%$; 500 vdcw; max body dimen 51/64" lg x 15/32" wd x 7/32" thk.	C-w oscillator coupling.....	
C-96, C-97	CAPACITOR, fixed: mica; JAN type CM20B750J; 75 uuf $\pm 5\%$; 500 vdcw; max body dimen 51/64" lg x 15/32" wd x 7/32" thk.	Avc diode coupling.....	
C-52, C-64, C-65 C-47, C-88	CAPACITOR, fixed: mica, silver; JAN type CM20C101G; 100 uuf $\pm 2\%$; 500 vdcw; max body dimen 51/64" lg x 15/32" wd x 7/32" thk.	C-52: First i-f, grid coupling... C-64: Secondary tuning, L-30... C-65: Second i-f, plate.....	
C-33, C-45, C-86, C-101	CAPACITOR, fixed: mica; JAN type CM20B101K; 100 uuf $\pm 10\%$; 500 vdcw; max body dimen 51/64" lg x 15/32" wd x 7/32" thk.	C-47: Coupling capacitor between h-f oscillator and mixer. C-88: Grid capacitor of h-f oscillator.	
C-25, C-38, C-100 C-71	CAPACITOR, fixed: mica; 125 uuf ± 1 uuf; 500 vdcw; 1 1/8" lg x 7/8" wd x 3/4" h o/a; 4 term; mts on bakelite base; Farnsworth part/dwg #CA-294.	C-33: Secondary r-f grid coupling. C-45: Mixer grid coupling..... C-86: C-w oscillator grid..... C-101: First r-f grid coupling... C-25: First r-f paddar..... C-38: Padder, mixer r-f circuit... C-100: Secondary r-f paddar... Diode i-f bypass.....	
C-53, C-55, C-57	CAPACITOR, fixed: mica; JAN type CM20B151J; 150 uuf $\pm 5\%$; 500 vdcw; max body dimen 51/64" lg x 15/32" wd x 7/32" thk.	C-53: Plate circuit fixed tuning, mixer. C-55: Secondary i-f grid circuit fixed tuning. C-57: First i-f plate circuit fixed tuning.	
C-115, C-117	CAPACITOR, fixed: mica; 470 uuf $\pm 10\%$; 500 vdcw; JAN type CM20B471K.	R-f bypass capacitors from each side of filament to ground of 6J5 h-f oscillator tube.	
C-72	CAPACITOR, fixed: mica; JAN type CM20C511G; 510 uuf $\pm 2\%$; 500 vdcw; max body dimen 51/64" lg x 15/32" wd x 7/32" thk.	Diode i-f filter.....	
C-113	CAPACITOR, fixed: mica; 510 uuf $\pm 2\%$; 500 vdcw; JAN type CM20D511G.	R-f bypass capacitor from screen grid of mixer (6L7) to ground.	
C-44	CAPACITOR, fixed: mica; 750 uuf $\pm 2\%$; 500 vdcw; JAN type CM30E751G.	Cathode bias bypass capacitor for h-f oscillator 6J5; 1.5 to 3 me band.	
C-94, C-95	CAPACITOR, fixed: mica; JAN type CM30C821G; 820 uuf $\pm 2\%$; 500 vdcw; max body dimen 53/64" lg x 53/64" wd x 9/32" thk.	Crystal filter bridge capacitors.	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
C-43	CAPACITOR, fixed: mica; 1600 uuf $\pm 2\%$; 500 vdcw; JAN type CM30E162G.	Cathode bias bypass capacitor for h-f oscillator 6J5; 3 to 5 mc band.	
C-42	CAPACITOR, fixed: mica; 3000 uuf $\pm 2\%$; 500 vdcw; JAN type CM30E302G.	Cathode bias bypass capacitor for h-f oscillator 6J5; 5 to 8 mc band.	
C-54, C-56, C-58, C-63, C-66, C-76, C-81	CAPACITOR, fixed: paper; JAN type CN41A103M 10,000 uuf $\pm 20\%$; 400 vdcw; 1 $\frac{3}{8}$ " lg x 41/64" wd x 9/32" thk.	C-54: Mixer, plate circuit r-f bypass. C-56: Second i-f, avc bypass.... C-58: First i-f, plate circuit i-f bypass. C-63: First i-f, avc bypass.... C-66: Second i-f, plate circuit i-f bypass. C-76: First audio plate to second a-f grid coupling. C-81: First audio, grid coupling.	
C-27, C-32, C-39, C-63, C-87, C-99, C-102	CAPACITOR, fixed: paper; JAN type CN43A503M; 50,000 uuf $\pm 20\%$; 400 vdcw; 1 15/32" lg x 49/64" wd x 13/32" thk.	C-27: First r-f, grid circuit capacitor. C-32: First r-f, screen circuit decoupling. C-39: Second r-f, screen circuit decoupling. C-63: First i-f, avc bypass.... C-87: C-w oscillator, plate bypass. C-99: Second r-f, avc bypass.... C-102: First r-f, avc bypass....	
C-29, C-30, C-31, C-35, C-36, C-37, C-48, C-49, C-50, C-59, C-60, C-61, C-68, C-69, C-70, C-73, C-74, C-75	CAPACITOR, fixed: paper; JAN type CP69B5FE503V; 3 sect; 50,000-50,000-50,000 uuf $+20\% -10\%$; 400 vdcw.	C-29: First r-f, cathode bypass.. C-30: First r-f, screen bypass.... C-31: First r-f, B supply bypass. C-35: Second r-f, cathode bypass. C-36: Second r-f, screen bypass. C-37: Second r-f, B supply bypass. C-48: Mixer, cathode bypass... C-49: Mixer, screen bypass.... C-50: Mixer B supply bypass... C-59: First i-f, cathode bypass... C-60: First i-f, screen bypass.... C-61: First i-f, B supply bypass. C-68: In set, but not used.... C-69: Second i-f, screen bypass. C-70: Second i-f, B supply bypass. C-73: Diode, cathode bypass... C-74: First audio, plate circuit a-f decoupling. C-75: Avc filter bypass.... H-f oscillator plate bypass....	
C-83	CAPACITOR, fixed: paper; JAN type CN43E104M; 100,000 uuf $\pm 20\%$; 400 vdcw; 1 15/32" lg x 49/64" wd x 13/32" thk.	Couples i-f output voltage to connector J-107 on front panel.	
C-68A	CAPACITOR, fixed: paper; 3 sect; 50,000-50,000-50,000 uuf $\pm 10\%$; 600 vdcw; JAN type CP53B1EF503K.	C-78 and C-79: Heater bypass..	
C-78, C-79	CAPACITOR, fixed: paper; JAN type CP53B5EE104V; 3 sect; 100,000-100,000-100,000 uuf $+20\% -10\%$; 400 vdcw;		

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
C-80	1 13/16" lg x 1" wd x 3/4" h.	C-80: Second audio, plate circuit a-f decoupling.	
C-98	CAPACITOR, fixed: paper; JAN type CP53B1FB405K; 4 uF ±10%; 100 vdcw; 2" lg x 2" wd x 1" h.	Second audio, cathode bypass..	
C-84	CAPACITOR CA-383: variable; air; 1 to 10 uuf; 0.008" air gap; 19/32" lg x 15/16" wd x 1 1/4" h, shaft 1" lg x 1/4" diam; Sig C dwg #SC-A-1728.	C-w oscillator tuning.....	
C-1, C-7, C-13 C-51	CAPACITOR, variable: air; plate meshing type; single sect; JAN type CT1CO25; 4 to 23 uuf; SLC characteristic; 600 v RMS; 1 1/16" lg x 13/16" wd x 1 1/2" h; screwdriver adj.	C-1: Band A trimmer, first r-f.. C-7: Band A trimmer, second r-f.. C-13: Band A trimmer, mixer... Crystal phasing	
C-4, C-5, C-6, C-10, C-11, C-12, C-16, C-17, C-18	CAPACITOR CA-323: variable; air; 4 uuf to 50 uuf, 0.008" air gap; 12 plates; 1 5/32" lg x 15/16" wd x 1 1/4" h; shaft 29/32" lg x 0.204" diam; Sig C dwg #SC-A-1728-3.	C-4: Band D trimmer, first r-f... C-5: Band E trimmer, first r-f... C-6: Band F trimmer, first r-f... C-10: Band D trimmer, second r-f. C-11: Band E trimmer, second r-f. C-12: Band F trimmer, second r-f. C-16: Band D trimmer, mixer... C-17: Band E trimmer, mixer... C-18: Band F trimmer, mixer... C-w oscillator, trimmer.....	
C-85	CAPACITOR, variable: air; plate meshing type; single sect; JAN type CT1CO75; 6.0 to 75 uuf; SLC characteristic; 600 v RMS; 1 1/2" lg x 5/8" wd x 1 7/32" h.	C-2: Band B trimmer, first r-f... C-3: Band C trimmer, first r-f... C-8: Band B trimmer, second r-f. C-9: Band C trimmer, second r-f. C-14: Band B trimmer, mixer... Antenna tuning, marked ALIGN INPUT.	
C-2, C-3, C-8, C-9, C-14 C-26	CAPACITOR, variable: air; plate meshing type; single sect; JAN type CT1CO100; 7.5 to 99 uuf; SLC characteristic; 600 v RMS; 1 1/8" lg x 5/8" wd x 1 7/32" h; screwdriver adj.	C-28: First r-f, tuning.....	
C-28, C-34, C-46, C-82 C-19 thru C-24	CAPACITOR CA-293: variable; air; 10 to 210 uuf; 0.008" min air gap; 2 5/8" lg x 1 1/4" diam; shaft 7/8" lg x 1/4" diam; Sig C dwg #SC-A-2580.	C-34: Second r-f, tuning.....	
	CAPACITOR CA-292: variable; air; 4 sect; 17 plates per sect; 13 to 226 uuf per sect; 7 5/8" lg x 2 23/32" wd x 3 3/8" h; shaft 3/4" lg x 1/4" diam; Sig C dwg #SC-D-2568.	C-46: Mixer, tuning.....	
L-19	CAPACITOR, variable: air; plate meshing type; single sect; 3 to 20 uuf; straight line capacity; 600 RMS test v; lg ex- cluding shaft 1 1/16" x 5/8" wd x 1 7/32" h; screwdriver or hex wrench adj; 8 plates; aluminum, silver pl; 360 deg rotation either direction; ceramic insulation; post term; three hole mtg 1 clearance hole for shaft in ctr 5/8" diam w/two mtg holes for #40 screws on 21/32" ctr; Underwood Elec #98- 4560; JAN spec JAN-C-92.	C-82: H-f oscillator, tuning..... C-19: H-f trimmer across L-19.. C-20: H-f trimmer across L-20.. C-21: H-f trimmer across L-21.. C-22: H-f trimmer across L-22.. C-23: H-f trimmer across L-23.. C-24: H-f trimmer across L-24..	
	CLAMP: dial; rolled steel; 3 1/4" x 1 1/2" h o/a; Rauland #VC-0060.	Dial lock.....	
L-20	CLIP: tube cont; brass; 1/4" lg x 1/4" ID; Natl Co. #8.....	Tube clip.....	
	COIL, RF: osc coil; 1 wnd w/tap; single layer wnd; unshielded; 45 1/2 turns #28 AWG enamel wire; 1 5/8" lg x 1" diam o/a; isolantite form; 1 5/8" lg x 1" diam o/a; built-in loop on end turn for tuning; adjust from top by bending loop; single hole mtg; #6 screw; 2 solder term at ends of wnd and one tap lead; max impr; B&W part #N-150.	Band A (1.5 to 3 mc) h-f oscil- lator coil.	
	COIL, RF: osc coil; 1 wnd w/tap, single layer wnd; unshielded-	Band B (3 to 5 mc) h-f oscillator	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
L-21	ed; $19\frac{3}{4}$ " turns #22 AWG enamel wire; $1\frac{5}{8}$ " lg x 1" diam o/a; isolantite form; $1\frac{5}{8}$ " lg x 1" diam o/a; built-in loop on end turn for tuning; adjust from top by bending loop; single hole mtg; #6 screw; 2 solder term at ends of wnd and one tap lead; wax impr; B&W part #N-151.	coil.	
L-22	COIL, RF: osc coil; 1 wnd w/tap, single layer wnd; unshielded; 11 turns #18 AWG enamel wire; $1\frac{1}{2}$ " lg x 1" diam; isolantite form $1\frac{1}{2}$ " lg x 1" wd x $1\frac{1}{2}$ " h o/a; built-in loop on end turn for tuning; adjust from end by bending loop; 4 hole mtg w/#3-48 screws on $\frac{1}{2}$ " and $1\frac{1}{4}$ " mtg/c; 2 solder term at ends of wnd and one tap lead; wax impr; B&W part #N-152.	Band C (5 to 8 mc) h-f oscillator coil.	
L-23	COIL, RF: osc coil; 1 wnd w/tap, single layer wnd; unshielded; 18 $\frac{1}{4}$ turns #18 AWG enamel wire; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; isolantite form; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; built-in loop on end turn for tuning; adjust from top by bending loop; single hole mtg; #6 screw; 2 solder term at ends of wnd and one tap lead; wax impr; B&W part #N-153.	Band D (8 to 11 mc) h-f oscillator coil.	
L-24	COIL, RF: osc coil; 1 wnd w/tap, single layer wnd; unshielded; 11 turns #18 AWG tinned wire; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; isolantite form; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; built-in loop on end turn for tuning; adjust from top by bending loop; single hole mtg; #6 screw; 2 solder term at ends of wnd and one tap lead; wax impr; B&W part #N-154.	Band E (11 to 14 mc) h-f oscillator coil.	
L-31	COIL, RF: BFO; universal wnd; unshielded; 225 turns #7-42 SSE Lite wire; $\frac{1}{2}$ " lg x $\frac{15}{16}$ " diam x $\frac{1}{4}$ " thk; Farnsworth part/dwg #B2563-15.	Band F (14 to 18 mc) h-f oscillator coil.	
L-13	COIL, RF: 1st detector; band A; single layer wnd; unshielded; $1\frac{3}{4}$ " lg x 1" diam; Farnsworth coil 52 $\frac{3}{4}$ turns tapped at $5\frac{1}{2}$ turns from start; Farnsworth part/dwg #2556-L13.	C-w boat oscillator coil.....	
L-14	COIL, RF: 1st detector; band B; integral; single layer wnd; unshielded; 22 $\frac{1}{2}$ turns #22 AWG E wire; tapped at $18\frac{1}{2}$ turns from start; $1\frac{3}{4}$ " lg x 1" diam; Farnsworth part/dwg #2556-L14.	Band A, mixer.....	
L-15	COIL, RF: 1st detector; band C; integral; single layer wnd; unshielded; 12 $\frac{1}{2}$ turns #18 AWG E wire; tapped at $5\frac{1}{2}$ turns from start; $1\frac{3}{4}$ " lg x 1" diam; Farnsworth part/dwg #2556-L15 or RCA part/dwg #T620350-L15.	Band B, mixer.....	
L-16	COIL, RF: 1st detector; band D; integral; single layer wnd; unshielded; 16 $\frac{1}{2}$ turns #18 AWG E wire; tapped at $4\frac{1}{2}$ turns from start; $1\frac{5}{8}$ " lg x $\frac{3}{4}$ " diam; Farnsworth part/dwg #2556-L16.	Band C, mixer.....	
L-17	COIL, RF: 1st detector; band E; single layer wnd; unshielded; 10 1/3 turns #18 AWG tinned wire; tapped at 6 turns from start; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; Farnsworth part/dwg #2556-L17 or RCA part/dwg #T620350-L17.	Band D, mixer.....	
L-18	COIL, RF: detector; Band F; single layer wnd; unshielded; 7 turns #18 AWG tinned wire; tapped at 3 turns from start; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; Farnsworth part/dwg #2556-L18 or RCA part/dwg #T620350-L18.	Band E, mixer.....	
L-32	COIL, RF: filter; universal wnd; unshielded; 725 turns #36 SS E wire; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; Sig C dwg #SC-D-2561.	Band F, mixer.....	
L-1	COIL, RF: 1st RF; band A; integral; single layer wnd; unshielded; 55 $\frac{1}{2}$ turns #28 AWG E wire; tapped at $10\frac{1}{2}$ turns	Filter, c-w oscillator.....	
		Band A, first r-f.....	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
L-2	from start; $1\frac{3}{4}$ " lg x 1" diam; Farnsworth part/dwg #2556-L1.		
L-3	COIL, RF: 1st RF; band B; integral; single layer wnd; unshielded; 22 1/6 turns #22 AWG E wire; tapped at 15 turns from start; $1\frac{3}{4}$ " lg x 1" diam; Farnsworth part/dwg #2556-L2.	Band B, first r-f.....	
L-4	COIL, RF: 1st RF; band C; integral; single layer wnd; unshielded; 12 7/12 turns #18 AWG E wire; tapped at 7 turns from start; $1\frac{3}{4}$ " lg x 1" diam; Farnsworth part/dwg #2556-L3 or RCA part/dwg #T620350-L3.	Band C, first r-f.....	
L-5	COIL, RF: 1st RF; band D; integral; single layer wnd; unshielded; 16 1/3 turns #18 AWG E wire; tapped at 3 1/2 turns from start; $1\frac{5}{8}$ " lg x $\frac{3}{4}$ " diam; Farnsworth part/dwg #2556-L4 or RCA part/dwg #T620350-L4.	Band D, first r-f.....	
L-6	COIL, RF: 1st RF; band E; integral; single layer wnd; unshielded; 11 turns #18 AWG tinned wire; tapped at 6 turns from start; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; Farnsworth part/dwg #2556-L5.	Band E, first r-f.....	
L-7	COIL, RF: 1st RF; band F; integral; single layer wnd; unshielded; 7 5/6 turns #18 AWG tinned wire; tapped at 3 turns from start; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; Farnsworth part/dwg #2556-L6 or RCA part/dwg #T620350-L6.	Band F, first r-f.....	
L-8	COIL, RF: 2nd RF; band A; integral; single layer wnd; unshielded; 52 2/3 turns #28 AWG E wire tapped at 5 1/2 turns from start; $1\frac{3}{4}$ " lg x 1" diam; Farnsworth part/dwg #2556-L7.	Band A, second r-f.....	
L-9	COIL, RF: 2nd RF; band B; integral; single layer wnd; unshielded; 21 5/6 turns #22 AWG E wire; tapped at 17 turns from start; $1\frac{3}{4}$ " lg x 1" diam; Farnsworth part/dwg #2556-L8.	Band B, second r-f.....	
L-10	COIL, RF: 2nd RF; band C; integral; single layer wnd; unshielded; 12 1/2 turns #18 AWG E wire; tapped at 3 turns from start; $1\frac{3}{4}$ " lg x 1" diam; Farnsworth part/dwg #2556-L9 or RCA part/dwg #T620350-L9.	Band C, second r-f.....	
L-11	COIL, RF: 2nd RF; band D; integral; single layer wnd; unshielded; 16 1/3 turns #18 AWG E wire; tapped at 3 7/12 turns from start; $1\frac{5}{8}$ " lg x $\frac{3}{4}$ " diam; Farnsworth part/dwg #2556-L10.	Band D, second r-f.....	
L-12	COIL, RF: 2nd RF; band E; single layer wnd; unshielded; 10 3/4 turns #18 AWG tinned wire; tapped at 6 turns from start; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; Farnsworth part/dwg #2556-L11.	Band E, second r-f.....	
SIG. ANT., J-107	COIL, RF: 2nd RF; band F; single layer wnd; unshielded; 6 5/6 turns #18 AWG tinned wire; tapped at 4 turns from start; $1\frac{3}{4}$ " lg x $\frac{3}{4}$ " diam; Farnsworth part/dwg #2556-L12.	Band F, second r-f.....	
SO-1	CONNECTOR, female contact: Sig C Socket SO-239; straight type; 1" lg x 1" h x 1" wd; round body, brass, silver plate; molded mica-filled bakelite insert; mts with w/4 holes $\frac{1}{8}$ " diam; 23/32" mtg/c; Sig C dwg #SC-D-5850; Amphenol #83-1R.	SIG. ANT.: Connects antenna lead-in to receiver. J-107: Connection for receiver i-f output to converter unit.	
	CONNECTOR, male contact: Sig C Socket SO-94; 14 round polarized cont; 12 small pins; 2 large pins angle type; $1\frac{3}{8}$ " x $1\frac{3}{8}$ " x 1 7/32"; Sig C dwg #SC-D-2592.	Power supply and control connector.	
	CONTACT, switch: beryllium copper; dull white nickel finish; $\frac{1}{16}$ " lg x $\frac{3}{16}$ " wd x 3/32" h o/a; Sig C dwg #SC-D-2566-M.	Part of crystal switch.....	
	COVER: telephone jack; aluminum 0.843" x 0.750" x 0.218"; engraved "Key"; Sig C dwg #SC-D-2532, item 36.	Jack cover.....	
	COVER: telephone jack; aluminum; 0.843" x 0.750" x 0.218"; engraved "Micro"; Sig C dwg #SC-D-2532; item 37.	Jack cover.....	
	COVER: telephone jack; aluminum; Sig C dwg #SC-D-2532, item 38.	Jack cover (speaker, second audio).	
	COVER: telephone jack; aluminum; Sig C dwg #SC-D-2532, item 39.	Jack cover (phones, second audio).	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
CX	CRYSTAL DC-6-A: quartz; 470 kc; ceramic; w/metal and bakelite cover; $2\frac{3}{16}$ " lg x $\frac{3}{4}$ " wd x 0.3225" thk; receiving; Sig C dwg #SC-D-2972.	Crystal filter.....	
	DIAL ASSEMBLY: gear driven; c/o calibrated dial; 2 brass gears, 2 studs, brass bushing, 2 backlash springs, and 4 rivets; Sig C dwg #SC-D-2547.	Tuning dial.....	
	DIAL ASSEMBLY: vernier tuning; c/o knob, dial plate, spring clutch, and brass insert; Sig C dwg #SC-D-5431-A.	Vernier dial.....	
	FASTENER, latch: panel; steel, dull finish; $\frac{1}{16}$ " lg x $\frac{5}{8}$ " diam x $3/32$ " thk; Sig C dwg #SC-D-4139, items 1, 2, and 3.	Panel latch.....	
	FASTENER, latch: panel; steel, dull finish; $\frac{1}{16}$ " lg x $\frac{5}{8}$ " diam x $\frac{3}{16}$ " thk; Farnsworth part/dwg #98-1340; Sig C dwg #SC-D-2534, items 4, 5, and 48.	Panel latch.....	
F-2	FUSE, cartridge: 1/8 amp rated cur; 0.065 amp; continuous load rating in use; blowing time: 110%—life, 135%—0-1 hour, 200%—5-60 seconds, rated voltage=250; 1 time; glass body; ferrule term; $1\frac{1}{4}$ " lg x $\frac{1}{4}$ " diam o/a; $\frac{1}{4}$ " diam term; Littelfuse #313.125.	Provides protection for Rectifier RA-20-B as result of overload conditions in Receiver R-336 /GRC-26.	
F-3	FUSE, cartridge: Sig C Fuse FU-27; 2 amp rated cur; 0.6 amp continuous load rating in use; blowing time: 110%—life, 135%—0-1 hour, 200%—0-2 hours, rated voltage=250; 1 time; glass body; ferrule term; $1\frac{1}{4}$ " lg x $\frac{1}{4}$ " diam o/a; $\frac{1}{4}$ " diam term; Littelfuse #312002.	Provides protection for input 115 volt a-c line as result of overload conditions in Rectifier RA-20-B and/or Receiver R-336/GRC-26.	
	GEAR SET: worm; brass; main tuning capacitor drive; c/o worm and worm wheel; Sig C dwg #SC-D-2549-N, items 32 and 33.	Tuning capacitor drive.....	
	HANDLE: panel; brass; 3 $15/32$ " lg x $\frac{1}{16}$ " wd x $29/32$ " h o/a; Hascheo #1137.	Panel handle.....	
	HOLDER, fuse: extractor post; for #3AG fuses; molded bakelite body w/extractor knob; 10 amp; $2\frac{1}{8}$ " lg x $\frac{1}{16}$ " diam; Littelfuse #1075.	Fuse holder.....	
	INSULATOR, feedthru: round; bakelite; $31/32$ " lg x approx $\frac{1}{16}$ " diam for $\frac{1}{16}$ " panel; Sig C dwg #SC-D-2553, item 4.	Feedthru.....	
	INSULATOR, feedthru: round; ceramic or bakelite; 0.800" lg x approx $\frac{1}{16}$ " diam for $3/32$ " panel; Sig C dwg #SC-D-2538, items 28, 29, 90, and 93.	Feedthru.....	
J-3, J-4	JACK JK-33-A: telephone; for 3 cond 0.205" diam plug; $1\frac{1}{4}$ " lg x $\frac{7}{8}$ " diam o/a; Sig C dwg #SC-D-2332.	J-3: SPEAKER 2ND AUDIO..	
J-1, J-2,	JACK JK-34-A: telephone; for 2 cond 0.25" diam plug; $1\frac{1}{4}$ " lg x 1" wd x $\frac{3}{4}$ " h; Sig C dwg #SC-D-2339.	J-4: MICRO.....	
J-5		J-1: PHONES-2ND AUDIO.....	
		J-2: PHONES-2ND AUDIO.....	
		J-5: KEY.....	
		Fast tuning.....	
		Crystal phasing knob.....	
		Switch control.....	
		Antenna alignment.....	
		Pitch adjustment.....	
		Volume control.....	
	KNOB: round; zinc alloy; shaft 0.1925" wd x 0.312" diam;	Frequency change.....	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	special mtg screw #5-32 through axis of knob; marked w/arrow; $1\frac{1}{8}$ " max h x $1\frac{1}{8}$ " diam o/a; band switch; Sig C dwg #SC-D-2550, item 56.		
LM-2, LM-3	KNOB ASSEMBLY: round; fast tuning; black bakelite; c/o shaft; eccentric bushing, pinion, sleeve, pin, knob, handle, 2 fiber washers, metal washer, plug button, 4 shim washers and spring, taper pin; Sig C dwg #SC-D-5431 and #SC-D-2549.	Fast tuning drive.....	
LM-1	LAMP LM-27: incandescent; 6-8 v, 0.25 amp; bulb T-3 $\frac{1}{4}$ clear; $1\frac{1}{4}$ " lg x $\frac{3}{8}$ " diam; miniature bayonet base; Sig C dwg #SC-D-2573, item 3.	Dial light.....	
	LAMP, glow: 90 v DC striking v; T-4 $\frac{1}{2}$ clear bulb; $1\frac{1}{4}$ " lg o/a; bayonet candelabra base; glow any position; Mazda type #NE-48.	Protects receiver input circuit from excessive voltages impressed on antenna.	
	LAMPHOLDER: miniature bayonet base; brass body; $1\frac{1}{4}$ " lg x $\frac{5}{8}$ " wd o/a; Sig C dwg #SC-D-2573-1.	Part of lampholder assembly for dial lamp, right-hand socket.	
	LAMPHOLDER: miniature bayonet base; brass body; $1\frac{1}{4}$ " lg x $\frac{5}{8}$ " wd o/a; Sig C dwg #SC-D-2573-2.	Part of lampholder assembly for dial, left socket.	
	LAMPHOLDER ASSEMBLY: neon; inside use; $4\frac{1}{4}$ " lg x $1\frac{1}{4}$ " wd x $2\frac{1}{16}$ " h o/a; c/o socket; lamp, capacitor, 2 spacers, and bracket; Farnsworth part/dwg #98-5448.	Neon lampholder.....	
	LAMPHOLDER ASSEMBLY: left- and right-hand mtg for dial lamp wired together; includes insulated and noninsulated lamp mtg; Sig C dwg #SC-D-2573.	Dial lampholder assembly.....	
	PLATE, jack: steel; "4000 OHMS" etched on one side, "250 OHMS" on other side; $\frac{3}{4}$ " wd x 1" h x $1\frac{1}{32}$ " thk o/a; Sig C dwg #SC-D-2536-M, item 89.	Jack plate.....	
	PLUG, machine thread: aluminum alloy; $\frac{1}{2}$ -28 thd; $\frac{5}{16}$ " diam x $9/64$ " thk; Sig C dwg #SC-D-2535, item 14.	Padder cover.....	
	PLUG, machine thread: nickel silver; $\frac{1}{2}$ -28 thd; $\frac{5}{16}$ " diam x $3/16$ " thk; Sig C dwg #SC-D-2535, item 88.	Chassis plug.....	
	POST, binding: push type; $\frac{5}{16}$ " lg x $1\frac{1}{2}$ " diam; Sig C dwg #SC-D-2532, item 71.	ALT. SIG. ANT. connection for plain wire feed.	
	POST, binding: push type; $\frac{5}{16}$ " lg x $1\frac{1}{2}$ " diam o/a; Sig C dwg #SC-D-2532, item 78.	Ground connection.....	
RL-1	RELAY BK-13: armature; DPST normally open; 2 $17/64$ " h x $1\frac{1}{8}$ " wd x $1\frac{1}{8}$ " d; closes at 7 to 8 v; 60 ohms DC resistance Sig C dwg #SC-D-1942.	Antenna grounding.....	
R-47	RESISTOR, fixed: comp; JAN type RC21BF620J; 62 ohms $\pm 5\%$; $\frac{1}{2}$ w; max body dimen 0.655" lg x 0.429" diam.	Filament shunt, diode.....	3RC21BF620J
R-5, R-11, R-17, R-22, R-27	RESISTOR, fixed: comp; JAN type RC21BF102K; 1000 ohms $\pm 10\%$; $\frac{1}{2}$ w; max body dimen 0.655" lg x 0.249" diam.	R-5: Plate circuit filter first r-f. R-11: Plate circuit filter, second r-f. R-17: Plate circuit filter, mixer. R-22: Plate circuit filter, first i-f. R-27: Plate circuit filter, second i-f.	3RC21BF102K
R-44	RESISTOR, fixed: comp; 3000 ohms $\pm 5\%$; 1 w, JAN type RC30BF302J.	Cathode bias resistor for h-f oscillator 6J5 on 5- to 8-mc band.	3RC30BF302J
R-41	RESISTOR, fixed: comp; 4700 ohms $\pm 10\%$; 1 w, JAN type RC30BF472K.	Plate dropping resistor for h-f oscillator tube 6J5.	3RC30BF472K
R-45	RESISTOR, fixed: Comp; 5100 ohms $\pm 5\%$; 1 w, JAN type RC30BF512J.	Cathode bias resistor for h-f oscillator 6J5 on 3- to 5-mc band.	3RC30BF512J
R-63, R-64	RESISTOR, fixed: comp; 7500 ohms $\pm 5\%$; $\frac{1}{2}$ w, JAN type RC20BF752J.	Voltage dropping resistors for screen grid circuit of mixer.	3RC20BF752J
R-46	RESISTOR, fixed: comp; 7500 ohms $\pm 5\%$; 1 w, JAN type RC30BF752J.	Cathode bias resistor for h-f oscillator 6J5 on 1.5- to 3-mc band.	3RC30BF752J
R-51, R-52	RESISTOR, fixed: comp; JAN type RC21BF103K; 10,000 ohms $\pm 10\%$; max body dimen 0.655" lg x 0.249" diam.	R-51: Filter load, c-w oscillator. R-52: Avc filter, first i-f.....	3RC21BF103K

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
R-42	RESISTOR, fixed: comp; 30,000 ohms $\pm 5\%$; $\frac{1}{2}$ w, JAN type RC20BF303J.	Grid bias resistor for h-f oscillator 6J5.	3RC20BF303J
R-3, R-9, R-21, R-26	RESISTOR, fixed: comp; JAN type RC20BF393K; 39,000 ohms $\pm 10\%$; $\frac{1}{2}$ w, max body dimen 0.468" lg x 0.249" diam.	R-3: Screen grid voltage dropping V-1. R-9: Screen grid voltage dropping V-2. R-21: Screen grid voltage dropping, first i-f amplifier. R-26: Screen grid voltage dropping, second i-f amplifier.	3RC20BF393K
R-13	RESISTOR, fixed: comp; JAN type RC10BF513J; 51,000 ohms $\pm 5\%$; $\frac{1}{4}$ w, max body dimen 0.406" lg x 0.170" diam.	Injector bias mixer.....	3RC10BF513J
R-33	RESISTOR, fixed: comp; JAN type RC21BF513J; 51,000 ohms $\pm 5\%$; $\frac{1}{2}$ w; max body dimen 0.655" lg x 0.249" diam.	Grid, second a-f.....	3RC21BF513J
R-2, R-8, R-38, R-48	RESISTOR, fixed: comp; JAN type RC20BF623J; 62,000 ohms $\pm 5\%$; $\frac{1}{2}$ w; max body dimen 0.468" lg x 0.249" diam.	R-2: Screen grid voltage divider, first r-f. R-8: Screen grid voltage divider, second r-f. R-38: L-29 primary loading.... R-48: Screen grid voltage divider, mixer.	3RC20BF623J
R-20, R-25	RESISTOR, fixed: comp; JAN type RC30BF623J; 62,000 ohms $\pm 5\%$; 1 w; max body dimen 0.750" lg x 0.280" diam.	R-20: Screen grid voltage divider, first i-f. R-25: Screen grid voltage divider, second i-f.	3RC30BF623J
R-4, R-10, R-16, R-18	RESISTOR, fixed: comp; JAN type RC10BF104K; 100,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; max body dimen 0.406" lg x 0.170" diam.	R-4: Ave filter, first r-f..... R-10: Ave filter, second r-f..... R-16: Ave filter, mixer.....	3RC10BF104K
R-23, R-37	RESISTOR, fixed: comp; JAN type RC21BF104K; 100,000 ohms $\pm 10\%$; $\frac{1}{2}$ w; max body dimen 0.655" lg x 0.249" diam.	R-18: Ave filter, first i-f..... R-23: Ave filter, second i-f..... R-37: C-w oscillator, plate dropping.	3RC21BF104K
R-36	RESISTOR, fixed: comp; JAN type RC30BF104K; 100,000 ohms $\pm 10\%$; 1 w; max body dimen 0.750" lg x 0.290" diam.	Bias voltage divider.....	3RC30BF104K
R-43	RESISTOR, fixed: comp; JAN type RC21BF204J; 200,000 ohms; $\pm 5\%$; $\frac{1}{2}$ w; max body dimen 0.655" lg x 0.249" diam.	Grid, c-w oscillator.....	3RC21BF204J
R-29, R-32	RESISTOR, fixed: comp; JAN type RC21BF244J; 240,000 ohms $\pm 5\%$; $\frac{1}{2}$ w; max body dimen 0.655" lg x 0.249" diam.	R-29: Diode ave filter.....	3RC21BF244J
R-49	RESISTOR, fixed: comp; JAN type RC21BF514J; 510,000 ohms $\pm 5\%$; $\frac{1}{2}$ w; max body dimen 0.655" lg x 0.249" diam.	R-32: Grid, first a-f..... Diode r-f filter.....	3RC21BF514J
R-30	RESISTOR, fixed: comp; JAN type RC20BF105K; 1 meg $\pm 10\%$; $\frac{1}{2}$ w; max body dimen 0.468" lg x 0.249" diam.	Ave load.....	3RC20BF105K
R-6, R-12, R-53	RESISTOR, fixed: comp; JAN type RC20BF205J; 2 meg $\pm 5\%$; $\frac{1}{2}$ w; max body dimen 0.468" lg x 0.249" diam.	R-6: Grid, second r-f..... R-12: Grid, mixer..... R-53: Grid, first r-f..... Cathode bias, mixer.....	3RC20BF205J
R-14	RESISTOR, fixed: WW, JAN type RU4C361J; 360 ohms $\pm 5\%$; 1 w; $1 \frac{9}{32}$ " lg x $9 \frac{3}{32}$ " diam.	R-1: Cathode bias, first r-f..... R-7: Cathode bias, second r-f..... R-19: Cathode bias, first i-f..... R-24: Cathode bias, second i-f..... Cathode bias, diode.....	
R-1, R-7, R-19, R-24	RESISTOR, fixed: WW; JAN type RU4C511J; 510 ohms $\pm 5\%$; 1 w; $1 \frac{9}{32}$ " lg x $9 \frac{3}{32}$ " diam.	Cathode bias, second audio.....	
R-28	RESISTOR, fixed: WW; JAN type RU4C751J; 750 ohms $\pm 5\%$; 1 w; $1 \frac{9}{32}$ " lg x $9 \frac{3}{32}$ " diam.	Dual volume control.....	
R-31, R-54	RESISTOR, fixed: WW; 2000 ohms $5 \pm 5\%$; 1 w; $1 \frac{9}{32}$ " lg x $9 \frac{3}{32}$ " diam; JAN type RU4C202J.		
R-34, R-35	RESISTOR, variable: Sig C Potentiometer RS-174; carbon; 2 sect; 500,000 ohms and 50,000 ohms; 1 w; $1 \frac{1}{8}$ " diam x $\frac{7}{8}$ " d; shaft $21 \frac{1}{32}$ " lg x $\frac{1}{4}$ " diam; Sig C dwg #SC-D-1982. SCREW, machine: brass; #6-32; $19 \frac{3}{32}$ " lg w/ $3/16$ " lg thd; head $\frac{1}{4}$ " diam; $3 \frac{3}{32}$ " thk; special tapered body portion not thd; Sig C dwg #SC-D-2546, item 4.		

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	SCREW, set: headless, pilot point; steel; #10-32"; $\frac{5}{16}$ " lg w/ $\frac{1}{4}$ " lg thd; pilot 0.109" diam x 0.065" lg; sq shoulder between thd portion and pilot point; Sig C dwg #SC-D-5431, item 85.		
	SHAFT: nickel silver; 1 23/32" lg x 0.2495" diam; Sig C dwg #SC-D-2550-P, item 48.	Fast tuning dial shaft.....	
	SHAFT: nickel silver; 2 13/32" lg x 0.2495" diam; Sig C dwg #SC-D-2550-P, item 51.	Vernier dial shaft.....	
	SHAFT: extension; crystal phasing; phenolic; 4 $\frac{1}{16}$ " lg x 0.3125" diam; w brass ferrule $\frac{7}{16}$ " lg x 0.314" ID; Sig C dwg #SC-D-2566M, items 33, 34.	Crystal phasing shaft tension.....	
	SHAFT: nickel silver; 1 $\frac{5}{16}$ " lg x 0.2495" diam o/a; Sig C dwg #SC-D-2550-P, item 49.	Dial and shutter gear shaft.....	
	SHAFT: worm gear; nickel silver; 2 $\frac{1}{16}$ " lg x 0.2495" diam o/a; Sig C dwg #SC-D-2550-P, item 50.	Worm gear shaft.....	
	SHAFT: stainless steel; 10 $\frac{1}{16}$ " lg x 0.253" wd x 0.0655" thk; Sig C dwg #SC-D-2549-W, item 42.	Band change for actuating wafer switch.	
	SHUTTER, dial: includes brass spur gear and 4 rivets; Sig C dwg #SC-D-2545, items 19, 20, 67, and 89.	Dial shutter.....	
	SOCKET, tube: std octal; molded mica filled bakelite or ceramic; 1 $\frac{1}{4}$ " diam x $\frac{1}{2}$ " h; Cinch #9863-1018; Sig C dwg #SC-D-2538, item 63.	Tube socket.....	
	SOCKET, tube: 8 cont octal; under chassis wafer mtg; 2 mtg slots 17/64" lg x 0.170" wd on 1 27/32" mtg/c; oval ceramic body 2 $\frac{1}{16}$ " lg x 1 $\frac{1}{16}$ " wd x 0.2207" thk o/a; phosphor bronze clip, beryllium copper spring silver pl 0.001 thk; Johnson EF type #122-228-9.	Tube socket for h-f oscillator.....	
	SPRING: compression; steel music wire; 1 3/64" lg x 9/32" OD o/a; Sig C dwg #SC-D-2545, item 41.	Band change switch spring.....	
	SPRING: compression; 0.051" diam steel music wire; 1 $\frac{1}{16}$ " lg x 9/32" OD o/a; Sig C dwg #SC-D-5431, item 6.	Detent adjust on switch detent plunger.	
	SPRING: extension; 0.14" steel music wire; $\frac{3}{8}$ " lg x 3/32" diam; Sig C dwg #SC-D-2549, item 36.	Backlash take-up on anti-backlash gear.	
	SPRING: extension; anti-backlash gears; 0.16" steel music wire; 11/64" lg x $\frac{1}{8}$ " diam; Sig C dwg #SC-D-2547, item 14.	Backlash take-up.....	
	SPRING: detent; steel; includes ball bearing and ball seat; 1 17/32" lg x 9/32" diam o/a; Sig C dwg #SC-D-2545.	Detent spring.....	
	STUD: aluminum alloy; $\frac{5}{16}$ " lg x $\frac{1}{4}$ " diam o/a; Sig C dwg #SC-D-1559-A.	Part of fast tuning knob.....	
SW-12	SWITCH SW-119: rotary; 1 $\frac{1}{8}$ " diam x 1 $\frac{1}{8}$ " lg; Sig C dwg #SC-D-2574.	ON-OFF and MVC-AVC switch	
SW-1	SWITCH SW-131: toggle; SPST; metal body; bakelite insulation; 1" h x $\frac{1}{2}$ " wd x 1 $\frac{3}{16}$ " lg; Sig C dwg #SC-A-1042.	Send-receive switch.....	
SW-11	SWITCH SW-139: toggle; SPST; metal body; bakelite insulation; $\frac{5}{8}$ " h x $\frac{1}{2}$ " wd x 1 $\frac{3}{16}$ " lg; Sig C dwg #SC-A-1042.	C-w oscillator on-off switch.....	
SW-2 thru SW-7	SWITCH SECTION, rotary: wafer; ceramic body; silver pl cont and rotor; 1 $\frac{1}{8}$ " x $\frac{5}{16}$ " thk; Sig C dwg #SC-D-2558, item 57.	SW-2: Band change, first r-f grid. SW-3: Band change, first r-f antenna. SW-4: Band change, second r-f grid. SW-5: Band change, first r-f plate. SW-6: Band change, mixer grid. SW-7: Band change, secqnd r-f plate. Selects proper h-f oscillator coil for h-f oscillator tube.	
SW-8, SW-9	SWITCH SECTION, rotary: selects proper osc coil for osc tube; p/o band change switch assembly; ceramic, isolantite; single rotor containing x type spring tempered brass; silver pl cont; 1 $\frac{1}{8}$ " diam x $\frac{5}{16}$ " thk; 2 mtg holes $\frac{1}{8}$ " diam on 1 $\frac{1}{16}$ " mtg/c; Centralab part #BAC2302B.		

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
T-2	TRANSFORMER C-160-A: AF; output; turns ratio 5000; 1885/470; upright shielded steel case; 2 1/32" x 1 5/8" x 2 21/32"; Sig C dwg #SC-D-2569.	Second audio output.....	
T-1	TRANSFORMER C-205: AF; interstage; turns ratio 5000: 2500/800; upright shielded case; 1 5/8" h x 2 1/32" lg x 1 5/8" wd; Sig C spec 71-309.	First audio output to socket SO-1.	
L-28	TRANSFORMER, IF; coil only; input; two wnd, pri and secnd; unshielded; 3 5/16" lg x 5/8" diam o/a; Sig C dwg #SC-D-2566 (w/crystal phasing; p/o Transformer C-282).	Mixer stage.....	
L-29	TRANSFORMER, IF; coil only; interstage; two wnd, pri and secnd; unshielded; 3 5/16" lg x 5/8" diam o/a; Sig C dwg #SC-D-2566 (p/o Transformer C-283).	First i-f transformer.....	
L-30	TRANSFORMER, IF; coil only; output; two wnd, pri and secnd; unshielded; 3 5/16" lg x 3/4" diam o/a; Sig C dwg #SC-D-2566 (p/o Transformer C-284).	Second i-f transformer.....	
	TRANSFORMER C-282: IF; 470 kc; input shielded 3 3/4". h x 1.632" wd x 2.664" d; includes 4 fixed capacitors, 2 fixed resistors; Sig C dwg #SC-D-4166.	Crystal filter unit.....	
V-9	TUBE, electron: tube type 6C5.....	C-w oscillator.....	
V-8	TUBE, electron: tube type 6F6.....	Audio amplifier.....	
V-4	TUBE, electron: tube type 6J5, triode.....	H-f oscillator tube.....	
V-1,	TUBE, electron: tube type 6K7.....	V-1: First r-f amplifier.....	
V-2,		V-2: Second r-f amplifier.....	
V-5,		V-5: First i-f amplifier.....	
V-6,		V-6: Second i-f amplifier.....	
V-3	TUBE, electron: tube type 6L7.....	Mixes r-f and h-f oscillator signals to produce the i. f.	
V-7	TUBE, electron: tube type 6R7.....	Detects modulated i-f signal, supplies avc voltage, and amplifies a-f signal.	
V-9	TUNING UNIT, RF: CW osc; 470 kc; c/o complete CW oscillator assembly; Sig C dwg #SC-D-2561.	Provides signal of approximately the intermediate frequency to make c-w signals audible.	
	TUNING UNIT, RF: 1st RF; freq range 1500 to 18,000 kc, 6 bands; 5" x 5 3/8" x 2 1/16" o/a; c/o 2 wafer sw, 6 coils, 6 variable capacitors, 4 fixed capacitors, 2 resistors, and term board; assembly shielded; Farnsworth part/dwg #2538-37.	Tunes first r-f stage.....	
	TUNING UNIT, RF: 2nd RF; freq range 1500 to 18,000 kc, 6 bands; 5" x 5 3/8" x 2 1/16" o/a; c/o 2 wafer sw, 6 coils, 6 variable capacitors, 4 fixed capacitors, 2 resistors and term board; Farnsworth part/dwg #2538-38.	Tunes second r-f stage.....	
	TUNING UNIT, RF: 1st detector; freq range 1500 to 18,000 kc, 6 bands; 5" x 5 3/8" x 2 1/16" o/a; c/o 2 wafer sw, 6 coils, 6 variable capacitors, 4 fixed capacitors, 2 resistors and term board; Farnsworth part/dwg #2538-36.	Tunes mixer stage.....	
	VENT: air; brass; 3/4" diam x 3/16" h; to fit 17/32" hole; RCA part/dwg #381525, part 1.	Ventilation.....	
	WASHER, flat: grey fiber; 0.261" ID x 1/2" OD x 1/32" thk; Sig C dwg #SC-D-2550-61.	Slip clutch.....	
	WINDOW: dial; clear glass; 2 39/64" lg x 1 1/16" thk x 2" wd one end, 3/4" wd other end; Sig C dwg #SC-D-2535-13.	Dial pane.....	

5. Identification Table of Parts for Mast AB-155/U

Name of part and description	Function of part	Signal Corps stock No.
MAST, antenna support; Army-Navy Mast AB-155/U; includes antenna components; steel mast; 40 ft h assembled.	Doublet antenna support.....	2A2088-155
BASE, mast: Army-Navy Mast Base AB-154/U; c/o Army-Navy Stake GP-101/U with mast section holder on swivel; aluminum, anodized;	Holds mast sections.....	

Name of part and description	Function of part	Signal Corps stock No.
painted olive drab; 18 $\frac{3}{4}$ " lg x 2 9/32" x 1 $\frac{3}{8}$ " o/a; driven into ground; B&W part #26-156; Sig C dwg #SC-D-28052-A.		
COVER: Army-Navy Cover CW-124/GRA-4; olive drab cotton duck; 9 $\frac{1}{2}$ " wd x 5 $\frac{1}{2}$ ft lg; B&W part #71; Sig C dwg #SC-D-28056-A.	Canvas cover for Carrying Device MX-387/GRA-4.	2A790-124
FASTENER, snap: Army-Navy Guy Fastener MX-379/U; snap; guy fastening; steel, galv; 5" lg x 1 $\frac{1}{4}$ " wd o/a; B&W part #76; Sig C dwg #SC-B-28050-A.	Secure guys to stakes.....	2A1050-379
FRAME: Army-Navy Carrying Device MX-387/GRA-4; includes 2 aluminum end plates, steel cable w/turnbuckle and hooks to hold end plates in position; painted olive drab B&W part #57; Sig C dwg #SC-D-28057-A.	Holds components of Mast AB-155/U for transportation.	2A950-387
GUY: Army-Navy Guy MX-381/GRA-4; antenna guy; c/o 40 ft lg nylon rope with North & Judd #125 $\frac{1}{8}$ snap, Locke Insul #27510 clevis and steatite insulator on one end; Fastener FT-9 on other end; 40 ft lg o/a; w/tag marked MX-381/GRA-4, 40 ft; guy color-coded white; Sig C dwg #SC-D-28053-A.	Center guy.....	2A1348-381
GUY: Army-Navy Guy MX-382/GRA-4; antenna guy; c/o 31 ft lg nylon rope w/North & Judd #125 $\frac{1}{8}$ snap, Locke Insul #27510 clevis and steatite insulator on one end; Fastener FT-9 on other end, 31 ft lg o/a; w/tag marked MX-382/GRA-4, 31 ft; guy color-coded blue; Sig C dwg #SC-D-28053-A.	Lower guy.....	2A1348-382
GUY: Army-Navy Guy MX-383/GRA-4; antenna guy; c/o 50 ft lg nylon rope w/North & Judd #125 $\frac{1}{8}$ snap, Locke Insul #27510 clevis and steatite insulator on one end; Fastener FT-9 on other end; 50 ft lg o/a; w/tag marked MX-383/GRA-4, 50 ft; guy color-coded red; Sig C dwg #SC-D-28053-A.	Upper guy.....	2A1348-383
HALYARD: Army-Navy Halyard MX-516/GRA-4; antenna halyard; c/o nylon rope, Block FT-127, insulator JAN type NS4B5224 and other hw; 140 ft lg o/a; Sig C dwg #SC-D-28054-A.	For hauling antenna wire to top of mast.	2A3180.1-516
HAMMER, hand: Sig C Hammer RM-1; engineer's type 2 face; 2 lb; hand forged steel head; hickory handle 16" lg o/a, smooth polished finish; Fed spec GGG-H-86, type G, class II.	To drive in antenna stakes....	6Q49001
PLATE, guy: Army-Navy Guy Plate MX-378/U; HRS painted olive drab; round; 3" OD, 1 $\frac{3}{8}$ " ID; placed between Mast Sections MS-44; 5 holes $\frac{3}{8}$ " diam on 2 $\frac{3}{8}$ " diam; B&W part #72; Sig C dwg #SC-A-28049-A.	For fastening guys and halyard.	2A2837-378
STAKE, guy: Army-Navy Stake GP-101/U; aluminum rod anodized, painted olive drab, steel head galv and painted olive drab; 15 $\frac{3}{4}$ " lg x 1 $\frac{1}{4}$ " diam o/a; B&W part #26-157; Sig C dwg #SC-D-28051-A.	For securing guys.....	2A3300-101
STAKE, guy: hickory; 30" lg x 1 $\frac{1}{2}$ " diam o/a; B&W part #94.....	For securing guys.....	3Z7850

6. Identification Table of Parts for Radioteletypewriter Control C-535/ GRC-26

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
J-3	CONTROL UNIT, radio set: Army-Navy Radioteletypewriter Control C-535/GRC-26; steel, black semiglass finish; 12" lg x 7" h x 3 $\frac{3}{4}$ " d o/a; 4 holes 0.187" diam on 5 $\frac{1}{4}$ " x 6 $\frac{1}{2}$ " ctr; U. S. Army spec 71-3334.	Switches functions of teletypewriters and provides connections for radio and teletypewriter components of Radio Set AN/GRC-26.	2C6401
J-4	CONNECTOR, female contact: 4 round female cont; straight type; 1 $\frac{3}{16}$ " square x $\frac{1}{16}$ " lg (less cont); 20 ampere cont w/200 DC volt spacing; cylindrical die-cast aluminum body w/mtg flange; anodized and bichromate seal; molded low-loss phenolic insert; mounts w/flange in hole $\frac{1}{8}$ " diam flange mtg —4 holes (0.120" diam) on 29/32" ctr, barrel thd $\frac{1}{8}$ "-20 x $\frac{1}{16}$ " lg approx; Army-Navy Aeronautical Type AN3102-14S-10S; A-N Aero spec AN-W-C-591.	Receives control unit Cord CX-957/TRA-7.	
	CONNECTOR, female contact: 4 round female cont; straight	Receives control unit Cord CX-	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	type; $1\frac{3}{16}$ " square x $\frac{5}{16}$ " lg (less cont); 20 amp cont w/200 DC volt spacing; cylindrical die-cast aluminum body w/mtg flange; anodized and bichromate seal; molded low-loss phenolic insert; mts w/flange in hole $\frac{7}{8}$ " diam, flange mtg—4 holes (0.120" diam) on 29/32" ctr, barrel thd— $\frac{7}{8}$ "—20 x $\frac{3}{16}$ " lg approx; Army-Navy Aeronautical Type AN-3102-14S-11S; A-N Aero spec AN-W-C-591.	958/TRA-7.	
J-1 J-6, J-7	CONNECTOR, male contact: 4 round male cont; straight type; $1\frac{3}{16}$ " square x $\frac{5}{16}$ " lg (less cont); 20 amp cont w/200 DC volt spacing; cylindrical die-cast aluminum body w/mtg flange; anodized and bichromate seal; molded low-loss phenolic insert; mts w/flange in hole $\frac{7}{8}$ " diam, flange mtg—4 holes (0.120" diam) on 29/32" ctr, barrel thd $\frac{7}{8}$ "—20 x $\frac{3}{16}$ " lg approx; Army-Navy Aeronautical type AN3102-14S-2P; A-N Aero spec AN-W-C-591.	J-1: Receives converter Cord CX-1150/U. J-6: Receives Exciter Cord CX-961/TRA-7 (blue) J-7: Receives exciter Cord CX-961/TRA-7 (red).	
J-2, J-5	CONNECTOR, male contact: 5 round male cont; straight type; $1\frac{3}{16}$ " square x $\frac{5}{16}$ " lg (less cont); 20 amp cont w/200 DC volt spacing; cylindrical die-cast aluminum body w/mtg flange; anodized and bichromate seal; molded low-loss phenolic insert; mounts w/flange in hole $\frac{7}{8}$ " diam, flange mtg—4 holes (0.120" diam) on 29/32" ctr, barrel thd $\frac{7}{8}$ "—20 x $\frac{3}{16}$ " lg approx; Army-Navy Aeronautical type AN3102-14S-5P; A-N Aero spec AN-W-C-591.	J-2: Receives converter Special Purpose Cable Assembly CX-1151/U. J-5: Receives control unit Cord CX-956/TRA-7.	
J-11, J-19	CONNECTOR, male contact: 3 round male cont; straight type; $1\frac{3}{16}$ " square x $\frac{5}{16}$ " lg (less cont); 20 amp cont w/200 DC volt spacing; cylindrical die-cast aluminum body w/mtg flange; anodized and bichromate seal; molded low-loss phenolic insert; flange mtd in hole $\frac{7}{8}$ " diam, flange mtg—4 holes (0.120" diam) on 29/32" ctr, barrel thd $\frac{7}{8}$ "—20 x $\frac{3}{16}$ " lg approx; Army-Navy Aeronautical type AN3102-14S-7P; A-N Aero spec AN-W-C-591.	J-11: Receives perforator Special Purpose Cable Assembly CX-1120/U. J-19: Receives speech amplifier Special Purpose Cable Assembly CX-1152/U.	
J-8, J-9, J-10, J-12 thru J-18	JACK, telephone: Sig C Jack JK-40; for 2 cond plug 0.25" diam; 1-19/32" lg x 1 3/64" h x $\frac{5}{8}$ " wd; J-3 cont arrangement; bushing $\frac{3}{8}$ "-32 thd incl 1 washer and 1 hex nut; mts in $\frac{3}{8}$ " diam hole; Mallory type #A2.	J-8: Receives cord from Key J-45 for emergency frequency-shift keying. J-9: Provides neutral output current from converter for local teletypewriters. J-10: Receives cord from Key J-45 for emergency c-w keying. J-12: Receives gray cord from Perforator TT-56/MGC. J-13: Receives red cord from Perforator TT-56/MGC. J-14: Receives black cord from Perforator TT-56/MGC. J-15: Receives red cord from "LEFT TELETYPEWRITER TT-55/MGC."	
	KNOB: rectangular w/circular hub; black bakelite; for $\frac{1}{4}$ " diam shaft; double #8-32 set cscrews; $\frac{1}{2}$ " h x $1\frac{1}{4}$ " lg x $\frac{3}{4}$ "	J-16: Receives black cord from "LEFT TELETYPEWRITER TT-55/MGC." J-17: Receives red cord from "RIGHT TELETYPEWRITER TT-55/MGC." J-18: Receives black cord from "RIGHT TELETYPEWRITER TT-55/MGC." Used to turn rotary switches. . .	

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
E-1 thru E-4	wd o/a; cad pl, steel insert; $\frac{1}{2}$ " d shaft hole; National Co #HRP. POST, binding: Sig C type TM-149; screw type action; brass, nickel pl; $\frac{1}{8}$ " x $\frac{3}{16}$ " max wire hole (adj); knurled mtg base; also includes rubber insulating cap cemented to knurled metal cap; Eby #14; Sig C dwg #SC-D-530-R.	Terminals for extension circuits..	
S-1, S-3	SWITCH, rotary: 6 circuits, 3 positions; 2 sect; silver-pl phosphor bronze cont springs; solid silver rotor cont plugs; phenolic wafers; $1\frac{1}{8}$ " diam x $3\frac{3}{4}$ " lg o/a; shorting type cont; lug type term; single hole mtg in $\frac{3}{8}$ " diam hole; bushing $\frac{3}{8}$ "-32 thd x $\frac{3}{8}$ " lg; Centralab #2BHX11322; Sig C dwg #SC-B-28001.	S-1: Selects function of left Teletypewriter TT-55/MGC. S-3: Selects function of right Teletypewriter TT-55/MGC.	
S-2	SWITCH, rotary: 12 circuits, 3 positions; 4 sect; silver-pl phosphor bronze cont springs; solid silver rotor cont slugs, phenolic wafers; $1\frac{1}{8}$ " diam x $3\frac{3}{4}$ " lg o/a; shorting type cont; lug type term; single hole mtg in $\frac{3}{8}$ " diam hole; bushing $\frac{3}{8}$ "-32 thd x $\frac{3}{8}$ " lg; Centralab #4BHX11321; Sig C dwg #SC-B-28000.	Selects function of Perforator-Transmitter TT-56/MGC.	
S-4	SWITCH, toggle: DPDT; JAN type ST52N; JAN spec JAN-S-23.	Selects function of Perforator-Transmitter TT-56/MGC.	

APPENDIX III

TABLE OF COMPONENTS

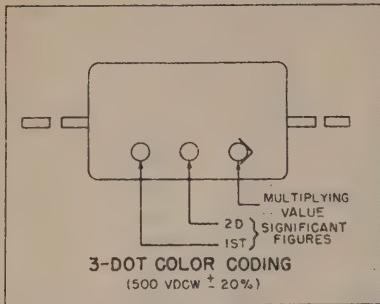
Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit volume (cu. ft.)	Unit weight (lb.)
Adapter M-359.....	5					0.1
Adapter Kit M-459.....	3	5 $\frac{3}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	0.032	1.5
Antenna Tuning Unit BC-939-A.....	1	14 $\frac{1}{2}$	23 $\frac{1}{2}$	11 $\frac{1}{4}$	2.24	48
Box BX-19-A, each containing spare fuses, lamps, and 9 metal tubes for Radio Receiver R-336/GRC-26.	2	4	2	12	.05	2.5
Bracket for Telephone EE-8.....	2	10 $\frac{1}{8}$	4 $\frac{1}{4}$	8	.199	1.5
Bracket MT-657/GRC.....	1	8 $\frac{1}{2}$	10	10	.492	
Broom, floor.....	1	60	2 $\frac{1}{2}$	10	.87	1
Brush, bench.....	1	3 $\frac{1}{4}$	$\frac{1}{2}$	14	.01	.2
Case CY-689/GRC-26 (for teletypewriter tape).....	1	22 $\frac{5}{8}$	19 $\frac{5}{8}$	15 $\frac{1}{8}$	4.02	6
Cement, household, stock No. 6G199.1.....	2	3	3	3	.015	.1
Chair, metal, stock No. 6M216-1.....	2	33 $\frac{3}{4}$	19	14 $\frac{3}{4}$	6.08	8
Chair, wood, stock No. 6M217.....	1	33 $\frac{5}{8}$	2 $\frac{1}{4}$	17 $\frac{1}{2}$	3.28	10
Cheesecloth, bleached (36 in. wide).....	3 yards	1	6	6	.02	.1
Clip, chart, stock No. 6Z1941.....	3	1	1	3	.002	.1
Clips, paper, large, stock No. 6M220.....	1 box	2	2	3	.007	.1
Clips, paper, small, stock No. 6M221.....	1 box	1	1 $\frac{1}{2}$	2 $\frac{1}{2}$	.002	.1
Clipboard, stock No. 6M226.....	1	12 $\frac{1}{2}$	1	9	.059	.5
Clock, stock No. 6Z1958.....	1	2 $\frac{1}{2}$	3	3	.013	1
Compass, magnetic, stock No. 6Z2203.....	1	4	$\frac{3}{4}$	3 $\frac{1}{2}$	.006	1
Connector, solderless, stock No. 6Z3191-5 (24 spares).....	30	23/32	19/64	$\frac{1}{16}$	.00009	.1
Control Box C-345A/MRC-2.....	1	3 $\frac{1}{2}$	2	6	.024	4
Cord CD-201-A, key.....	1			62 $\frac{1}{4}$		.5
Cord CD-267, loudspeaker (1 spare).....	3			46		.5
Cord CD-605, headset (1 spare).....	2			78		1
Cord CD-763, transmitter power (1 spare).....	2			156		3
Cord CD-764, couples transmitter and speech amplifier (1 spare).....	2			168		1.5
Cord CG-67/MRQ-2, connects radio receiver and Mast Base MP-65 (1 spare).....	3			66		2
RF Cable Assembly CG-557/U transmission line (1 spare).....	2			75 ft.		7
RF Cable Assembly CG-557/U receiving antenna lead-in.....	2			500 ft.		37
RF Cable Assembly CG-558/U couples transmitter and antenna tuning unit (1 spare).....	2			27		.5
Special Purpose Cable Assembly CX-1120/U, couples perforator and teletypewriter control (1 spare).....	2			30		.5
Special Purpose Cable Assembly CX-1150/U, couples converter and teletypewriter control (1 spare).....	2			162		1.5
Special Purpose Cable Assembly CX-1151/U, couples converter and teletypewriter control (1 spare).....	2			162		1.5
Special Purpose Cable Assembly CX-1152/U, couples speech amplifier and teletypewriter control (1 spare).....	2			54		.8
Power Cable Assembly CX-1165/U, power from Power Unit PE-95 (1 spare).....	2			12 ft.		10
Power Cable Assembly CX-1166/U, power extension (1 spare).....	2			50 ft.		30
Cover BG-198 (for teletypewriter).....	2	15 $\frac{7}{8}$	21 $\frac{3}{8}$	18 $\frac{1}{2}$	3.63	3
Cover BG-199 (for typing perforator).....	1	13 $\frac{5}{8}$	21 $\frac{3}{4}$	17 $\frac{5}{8}$	2.91	3
Cover BG-200 (for transmitter-distributor).....	1	10 $\frac{1}{4}$	17 $\frac{1}{2}$	9	.93	1.5
Drum, gasoline, stock No. 6Z3654.....	6	17 $\frac{3}{4}$	6 $\frac{1}{2}$	13 $\frac{7}{8}$	.93	10
Eraser, typewriter, stock No. 6M435.....	4	1 $\frac{1}{2}$	$\frac{3}{8}$	1 $\frac{1}{2}$	.0002	.1
Frequency Meter BC-221-(*).....	1	12 $\frac{1}{2}$	9 $\frac{5}{8}$	10	.692	38
Fuse, $\frac{1}{4}$ amp, 250V (spares).....	5	$\frac{1}{4}$	$\frac{1}{4}$	1 $\frac{1}{4}$	.00004	.1
Fuse, 5 amp, 250V (spares).....	5	$\frac{1}{4}$	$\frac{1}{4}$	1 $\frac{1}{4}$	.00004	.1

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit volume (cu. ft.)	Unit weight (lb.)
Fuse, 15 amp, 250V (spares).....	5.....	¾	¾	2	.00004	.1
Ground Rod GP-26.....	1.....	½	½	54	.0078	2.5
Hammer, sledge.....	1.....	37	2½	5	.267	7
Hardware kit.....	1.....	6½	6½	6½	.158	3
Headset HS-30 (1 spare).....	2.....	1½	5	5	.024	.8
Heater, electric, 1500 w, 115 v, 60 cyc ac.....	1.....	12½	7½	8½	.458	18
Insulator, bowl, steatite (1 spare).....	2.....	2 23/32	5¼	5¼	.044	1
Insulator, strain, JAN type NS4B5224 (18 spares).....	24.....	¾	¾	4½	.00134	.2
Key J-45.....	1.....	6	4½	5½	.088	1.5
Lamp, fluorescent, 20 w, 110-125 v, 50 cyc ac (3 spares).....	8.....	2	2	24	.055	.1
Lamp, incandescent, 15 w, 115-125 v (spares).....	2.....	3	3	2½	.0137	.1
Lamp, trouble, 115 v, stock No. 6Z6897-2, includes 1 each lamp, 50 w, 120 v, RS, stock No. 6Z6820-1.	1.....	5¾	4	25 ft. cord	.33	2.5
Lead, electrical #7 AWG wire braid.....	2.....	¾	1	120	.00435	.5
Line Unit BE-77-A.....	1.....	6¾	8¼	6	.183	6
Loudspeaker LS-3.....	2.....	8¼	5¼	8¼	.206	5
Mast AB-155/U (doublet antenna) each consists of:	6.....	5¾	7¼	66	1.6	55
Carrying Device MX-387/GRA-4.....	1.....	5¾	7¼	66	1.6	6
Cover CW-124/GRA-4.....	1.....	¾	9¾	66	.28	2
Guy MX-381/GRA-4 (center).....	4.....			40 ft.		1
Guy MX-382/GRA-4 (lower).....	4.....			31 ft.		1
Guy MX-383/GRA-4 (upper).....	4.....			50 ft.		1
Guy Fastener MX-379/U (2 spares).....	6.....	1¼	1	5	.0036	.5
Guy Plate MX-378/U (2 spares).....	5.....	¾	3	3	.0003	.2
Halyard MX-516/GRA-4.....	1.....			1,680		3
Hammer HM-1.....	1.....	1½	4½	16	.06	2.5
Mast Base AB-154/U.....	1.....	18¾	1¾	2 9/32	.034	1.5
Mast Section MS-44-A.....	8.....			66		3
Stake GP-101/U (2 spares).....	6.....	15¾	1¼	1¼	.014	1.5
Stake, hickory.....	4.....	1½	1½	30	.039	2.5
Mast Base MP-47-A (for transmitting whip) (1 spare).....	2.....	8½	8½	20	.84	30
Mast Base MP-65-C (for receiving whip).....	3.....	3	3	16½	.086	5
Mast Base Bracket MP-50 (for Mast Base MP-65-C).....	3.....	5½	5¼	9	.15	4.5
Mast Section MS-49 (2 spares).....	3.....	½	½	38½	.0056	1
Mast Section MS-50 (2 spares).....	3.....	½	½	39½	.0057	1
Mast Section MS-51 (2 spares).....	3.....	½	½	39½	.0057	1
Mast Section MS-52 (2 spares).....	3.....	½	½	39½	.0057	1
Mast Section MS-53 (2 spares).....	3.....	½	½	39½	.0057	1
Mast Section MS-116-A (4 spares).....	8.....	½	½	39½	.0057	1
Mast Section MS-117-A (2 spares).....	4.....	½	½	39½	.0057	1
Mast Section MS-118-A (2 spares).....	4.....	½	½	39½	.0057	1
Microphone T-17.....	1.....	2½	2½	5¾	.023	1
Microphone T-50.....	1.....	4	2	2¼	.0104	1.5
Oil, lubricating, 3-in-1, in 3-ounce can, stock No. 6G1315.....	2.....	1	2	4½	.0052	.4
Paper, bond, white stock No. 6M700.....	2 reams	8½	3	10½	.155	5
Paper, teletypewriter, 8½ in. wd, 4½ in. roll, stock No. 4T1.....	15 rolls	4½	4½	8½	.10	5
Paper, teletypewriter, 8½ in. wd, x 350 ft lg, with 2 car- bon inserts, stock No. 4T3.....	15 rolls	6	6	8½	.177	5.5
Pencil M-139.....	1 doz.	¾	2	7	.0061	0.4
Pencil M-140.....	2 doz.	¾	2	7½	.0065	0.4
Perforator-Transmitter TT-56/MGC.....	1.....	13½	21	25	4.1	85
Pick-up Antenna AT-137/MRC-2 (1 spare).....	2.....			4 ft		0.5
Pole, wood, lance.....	4.....	1¾	1¾	137	.242	3.5
Power Unit PE-95-G.....	1.....	38½	28¼	67½	41.5	1,556
Rack MT-655/GRC (for Cord CG-557/U (500 ft) and Reels DR-4).....	2.....	2	7½	17	.148	8
Rack MT-656/MRC (for gasoline drum).....	1.....	17	15¾	44½	6.8	40
Radio Receiver R-336/GRC-26.....	2.....	9¼	10¾	18	1.05	65
Radioteletype equipment consists of:	1.....					

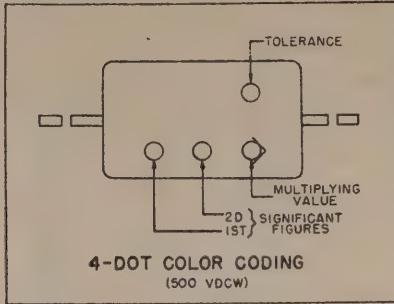
Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit volume (cu. ft.)	Unit weight (lb.)
Control Unit C-292B/TRA-7 in Case CY-826/GRC-26.	1.....	11 $\frac{7}{12}$	12 $\frac{5}{6}$	19 $\frac{1}{8}$	1.71	185
Dual Diversity Converter CV-31B/TRA-7 in Case CY-825/GRC-26.	1.....	20 $\frac{7}{8}$	17 $\frac{5}{6}$	19 $\frac{1}{4}$	4.05	200
Frequency Shift Exciter O-39B/TRA-7 in Case CY-827/GRC-26.	1.....	12 $\frac{5}{8}$	16 $\frac{3}{8}$	19	2.28	110
Cord CG-389/U (couples transmitter and exciter) (1 spare).	2.....			72	.....	2
Cord CG-390/U (couples exciter and frequency meter) (1 spare).	2.....			36	.....	.8
RF Cable Assembly CG-562/U (couples converter and receiver) (1 spare).	3.....			96	.....	1.5
Cord CX-954/TRA-7 (converter power) (1 spare)....	2.....			72	.....	.5
Cord CX-955/TRA-7 (couples converter and receiver) (1 spare).	3.....			84	.....	0.8
Cord CX-956/TRA-7 (couples control unit and teletypewriter control) (1 spare).	2.....			72	.....	1.5
Cord CX-957/TRA-7 (couples control unit and teletypewriter control) (1 spare).	2.....			72	.....	1.5
Cord CX-958/TRA-7 (couples control unit and teletypewriter control) (1 spare).	2.....			72	.....	1.5
Cord CX-959/TRA-7 (control unit power) (1 spare)....	2.....			72	.....	1.5
Cord CX-961/TRA-7 (blue) (couples exciter and teletypewriter control) (1 spare).	2.....			48	.....	1.5
Cord CX-961/TRA-7 (red) (couples exciter and teletypewriter control) (1 spare).	2.....			48	.....	1.5
Cord CX-962/TRA-7 (exciter power) (1 spare)....	2.....			48	.....	1.5
Radioteletypewriter Control C-335/GRC-26.....	1.....	7	3 $\frac{3}{4}$	12	.183	4.5
Radio Transmitter T-213/GRC-26.....	1.....	45	30	31	24.2	400
Rectifier RA-20-B (spare).....	1.....	6-57/64	5-1/32	7 $\frac{7}{16}$	.5	10.8
Rectifier RA-87.....	1.....	7 $\frac{1}{2}$	8 $\frac{3}{8}$	14 $\frac{9}{16}$	.53	40
Rectifier Power Unit RA-133-A.....	1.....	5 $\frac{3}{16}$	6	8 $\frac{3}{4}$	.158	60
Reel DR-4.....	2.....	22	6 $\frac{1}{4}$	22	1.75	3.5
Reel RL-29.....	2.....	5 $\frac{1}{2}$	$\frac{3}{16}$	11 $\frac{1}{2}$	.0069	2
Reel Unit RL-31.....	1.....	35	30	30	1.82	35
Rope RP-3.....	50 ft.	$\frac{3}{16}$	$\frac{3}{16}$	600	.012	1.02
Shelter S-55/GRC, includes cabinets, operating tables, and fire extinguisher, 4 lb CO ₂ type, Corps of Engineers stock No. 584276.200.040.	1.....	79 $\frac{1}{2}$	81 $\frac{1}{2}$	145	545	3,100
Solder M-31.....	1 lb.....	3	3	3	.016	1
Speech Amplifier BC-614-H.....	1.....	9 $\frac{1}{2}$	9 $\frac{3}{4}$	16 $\frac{1}{2}$	.885	30
Spout, for gasoline drum, stock No. 6Z3654/1.....	3.....	2	2	16 $\frac{1}{4}$	.038	1.5
Stamp MC-181-A, time clock.....	1.....	10 $\frac{1}{2}$	6 $\frac{1}{4}$	6 $\frac{3}{4}$	.257	8
Starter, lamp (3 spares)....	8.....	$\frac{3}{4}$	$\frac{3}{4}$	1 $\frac{1}{2}$	.0005	.1
Strap, for folding chair).....	2.....	$\frac{1}{8}$	1	10	.0007	.1
Strap, web (for lance pole).....	4.....	$\frac{1}{8}$	1 $\frac{1}{2}$	18	.002	.2
Strap, web (for Reel Unit RL-31).....	1.....	$\frac{1}{8}$	1 $\frac{1}{2}$	17 $\frac{1}{8}$	.002	.2
Strap, web (for Mast AB-155/U).....	3.....	$\frac{1}{8}$	1 $\frac{1}{2}$	56	.006	.5
Strap, web (for broom and sledge).....	2.....	$\frac{1}{8}$	1 $\frac{1}{2}$	6 $\frac{3}{4}$	.00073	.1
Tape TL-83 (friction).....	1 roll.....	3	3	$\frac{3}{4}$	.0039	.5
Tape TL-192 (rubber).....	1 roll.....	3 $\frac{3}{4}$	3 $\frac{3}{4}$	$\frac{3}{4}$	.006	.5
Tape, measuring, steel, 100 ft, stock No. 6R36026.1.....	1.....	$\frac{3}{4}$	4 $\frac{3}{8}$	4 $\frac{3}{8}$	.0083	2
Telephone EE-8-(*).....	2.....	9 $\frac{1}{2}$	3 $\frac{1}{2}$	7 $\frac{7}{16}$	.143	16
Teletypewriter TT-55/MGC.....	2.....	15 $\frac{1}{2}$	18	18	2.92	60
Test Unit I-176.....	1.....	5 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	.31	9
Tool Equipment TE-50-A.....	1.....	6	13 $\frac{1}{2}$	19 $\frac{1}{2}$	.92	30
Tool Equipment TE-113.....	1.....	7 $\frac{5}{6}$	8 $\frac{1}{2}$	21	.755	65
Trailer, 1-ton, 2-wheel, stock No. 6J952.1.....	1.....	67 $\frac{1}{2}$	73	145 $\frac{1}{2}$	415	1,300
Tube, flexible, exhaust, for Power Unit PE-95-G.....	1.....	1 $\frac{7}{8}$	1 $\frac{7}{8}$	120	.244	10
Typewriter MX-322/U.....	1.....	6 $\frac{1}{4}$	14	14	.71	20

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit volume (cu. ft.)	Unit weight (lb.)
Typing unit, stock No. 4TBP22/210 (spare)	1	12	14	15½	1.51	35
Whip antenna hold-down (receiver) (1 spare)	3			135		1
Whip antenna hold-down (transmitter) (1 spare)	2			137		1
Wire W-1 (500 ft length)	2 lengths			1,000 ft		2.5
Wire WD-1/TT, ½ mile in Wire Dispenser MX-306/G	2	6½	15	15	.845	30
Wrench (for removing bolts of transmitter)	1	7½	¾	44	.136	2.5
Technical Bulletin TB SIG 220	2	¼	7½	10¼	.012	.4
Technical Manual TM 11-264	2	½	7½	10¼	.024	1.3
Technical Manual TM 11-278	2	½	7½	10¼	.024	1.3
Technical Manual TM 11-281	2	½	7½	10¼	.024	1.3
Technical Manual TM 11-850	2	½	5½	9½	.0156	.75
Technical Manual TM 11-2201	2	½	7½	10¼	.024	1.3
Technical Manual TM 11-2222	2	½	7½	10¼	.024	1.3
Technical Manual TM 11-2223	2	½	7½	10¼	.024	1.3
Technical Manual TM 11-359	2	½	5½	8½	.003	.4
Technical Manual TM 11-957	2	½	5½	9½	.004	.3
Technical Manual TM 11-352	2	½	7½	10¼	.024	1.3
Technical Manual TM 11-300	2	¼	7½	10¼	.012	.5
Technical Manual TM 11-333	2	½	5½	9½	.004	.3
Technical Manual TM 11-2626	2	½	7½	10¼	.024	1.3
Technical Manual TM 11-5500	2	½	7½	9½	.005	.3
Total						8,881.6

RMA 3-4-5-8-6-DOT COLOR CODES FOR
MICA-DIELECTRIC CAPACITORS

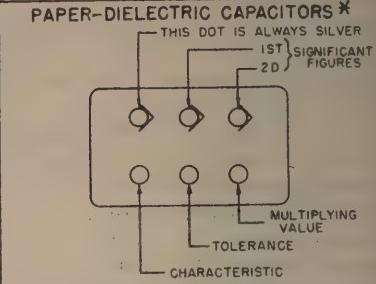


A

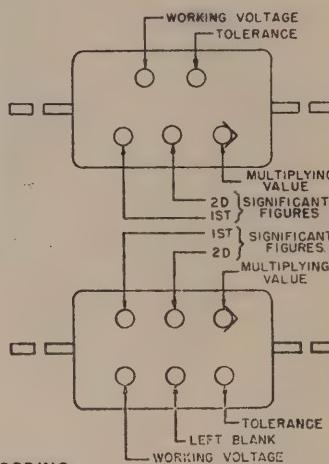
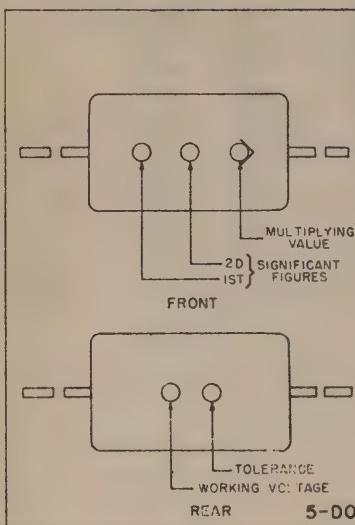


B

JAN 6-DOT COLOR CODES FOR:



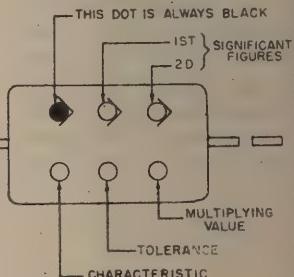
F



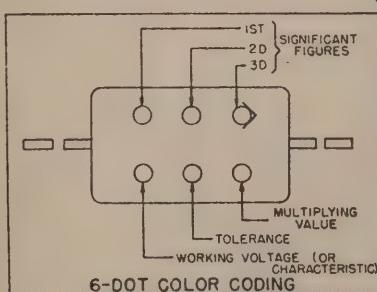
5-DOT COLOR CODING

C

MICA-DIELECTRIC CAPACITORS †

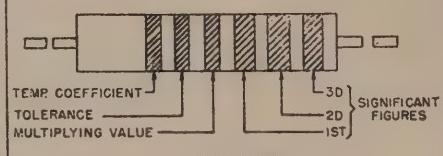


G

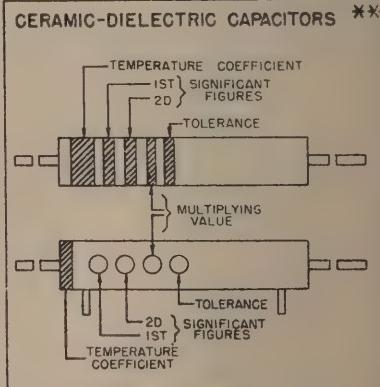


D

RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS



E



H

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE			RMA VOLTAGE RATING
		RMA MICA- AND CERAMIC-DIELECTRIC	JAN MICA- AND PAPER-DIELECTRIC	JAN CERAMIC-DIELECTRIC	
BLACK	0	1	1	1	-
BROWN	1	10	10	10	100
RED	2	100	100	100	200
ORANGE	3	1,000	1,000	1,000	300
YELLOW	4	10,000	10,000	10,000	400
GREEN	5	100,000	100,000	10,000	500
BLUE	6	1,000,000	1,000,000	10,000	600
VIOLET	7	10,000,000	10,000,000	100	700
GRAY	8	100,000,000	100,000,000	0.01	800
WHITE	9	1,000,000,000	1,000,000,000	0.01	900
GOLD	-	0.1	0.01	0.01	1,000
SILVER	-	0.01	0.01	0.01	2,000
NO COLOR	-				500

NOTES

* THE SILVER DOT IDENTIFIES THIS MARKING FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

† THE BLACK DOT IDENTIFIES THIS MARKING FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

** CAPACITORS MARKED WITH THIS CODE HAVE A VOLTAGE RATING OF 500 VDCW. OTHER THE BAND OR DIP CODE MAY BE USED FOR BOTH INSULATED (AXIAL-LEAD) OR UNINSULATED (RADIAL-LEAD) CAPACITORS.

RMA: RADIO MANUFACTURERS ASSOCIATION

JAN: JOINT ARMY-NAVY

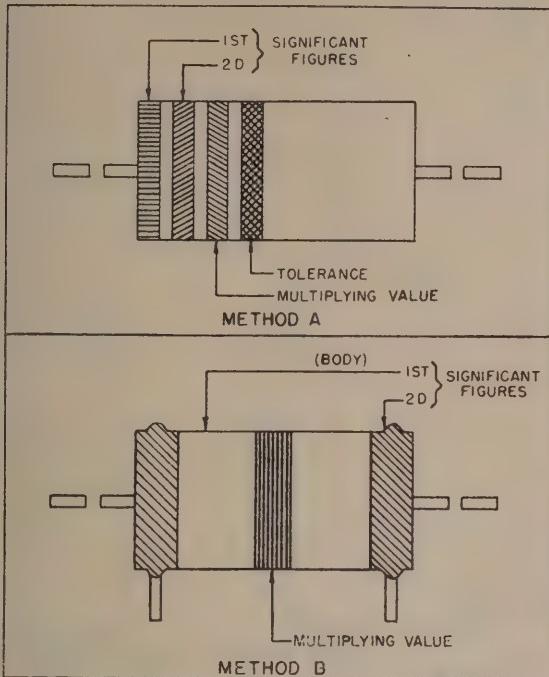
THESE COLOR CODES GIVE CAPACITANCES IN MICROMICROFARADS.

TL 324535

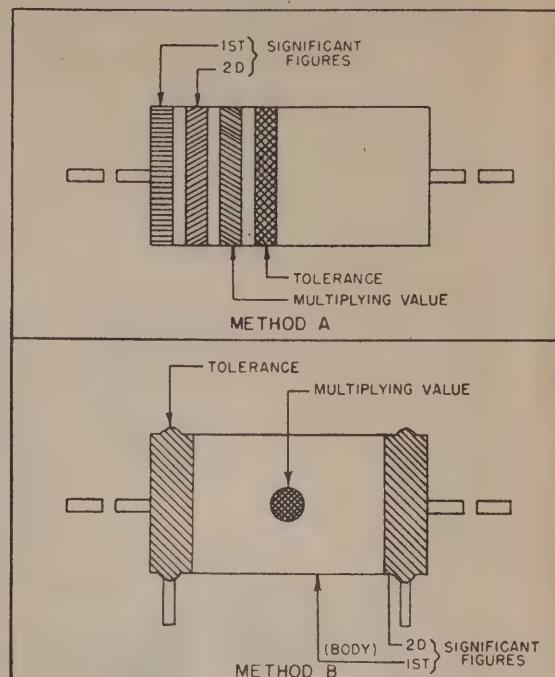
Figure 67. Capacitor color codes.

I PER 3 AND 4,
IL BLOCK.
UMPER 4 AND 5,
K.
WN, CAPACITORS

RMA COLOR CODE FOR
FIXED COMPOSITION RESISTORS*



JAN COLOR CODE FOR
FIXED COMPOSITION RESISTORS†



A

B

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE	TOLERANCE (%)
BLACK	0	1	± -
BROWN	1	10	± 1
RED	2	100	± 2
ORANGE	3	1,000	± 3
YELLOW	4	10,000	± 4
GREEN	5	100,000	± 5
BLUE	6	1,000,000	± 6
VIOLET	7	10,000,000	± 7
GRAY	8	.100,000,000	± 8
WHITE	9	.100,000,000	± 9
GOLD	-	0.1	± 5
SILVER	-	0.01	± 10
NO COLOR	-	-	± 20

NOTES

* INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A NATURAL TAN BACKGROUND COLOR. NON-INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A BLACK BACKGROUND.

† RESISTORS WITH AXIAL LEADS ARE INSULATED. RESISTORS WITH RADIAL LEADS ARE NON-INSULATED.

RMA: RADIO MANUFACTURERS ASSOCIATION

JAN: JOINT ARMY-NAVY

THESE COLOR CODES GIVE ALL RESISTANCE VALUES IN OHMS.

TL 32454S

Figure 68. Resistor color codes.

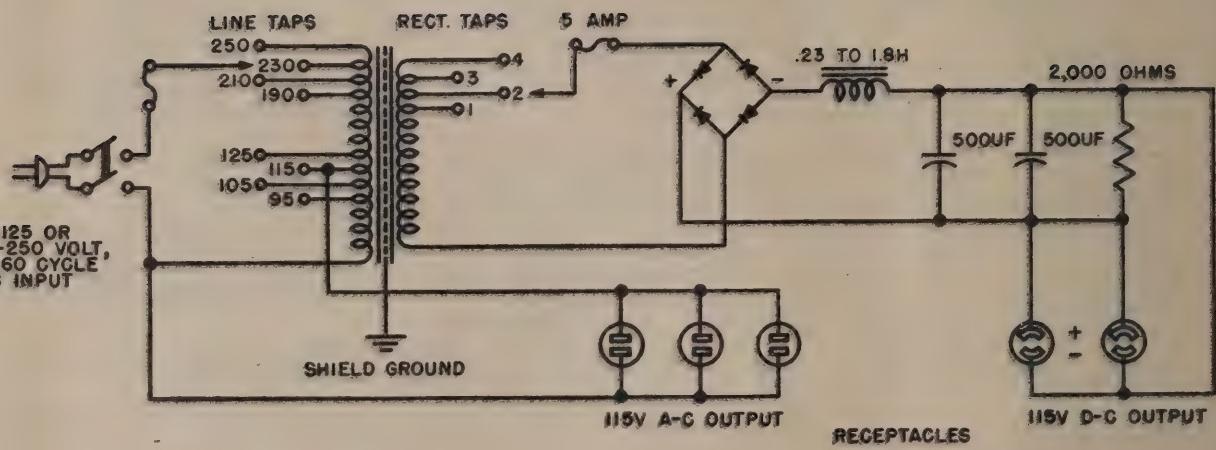
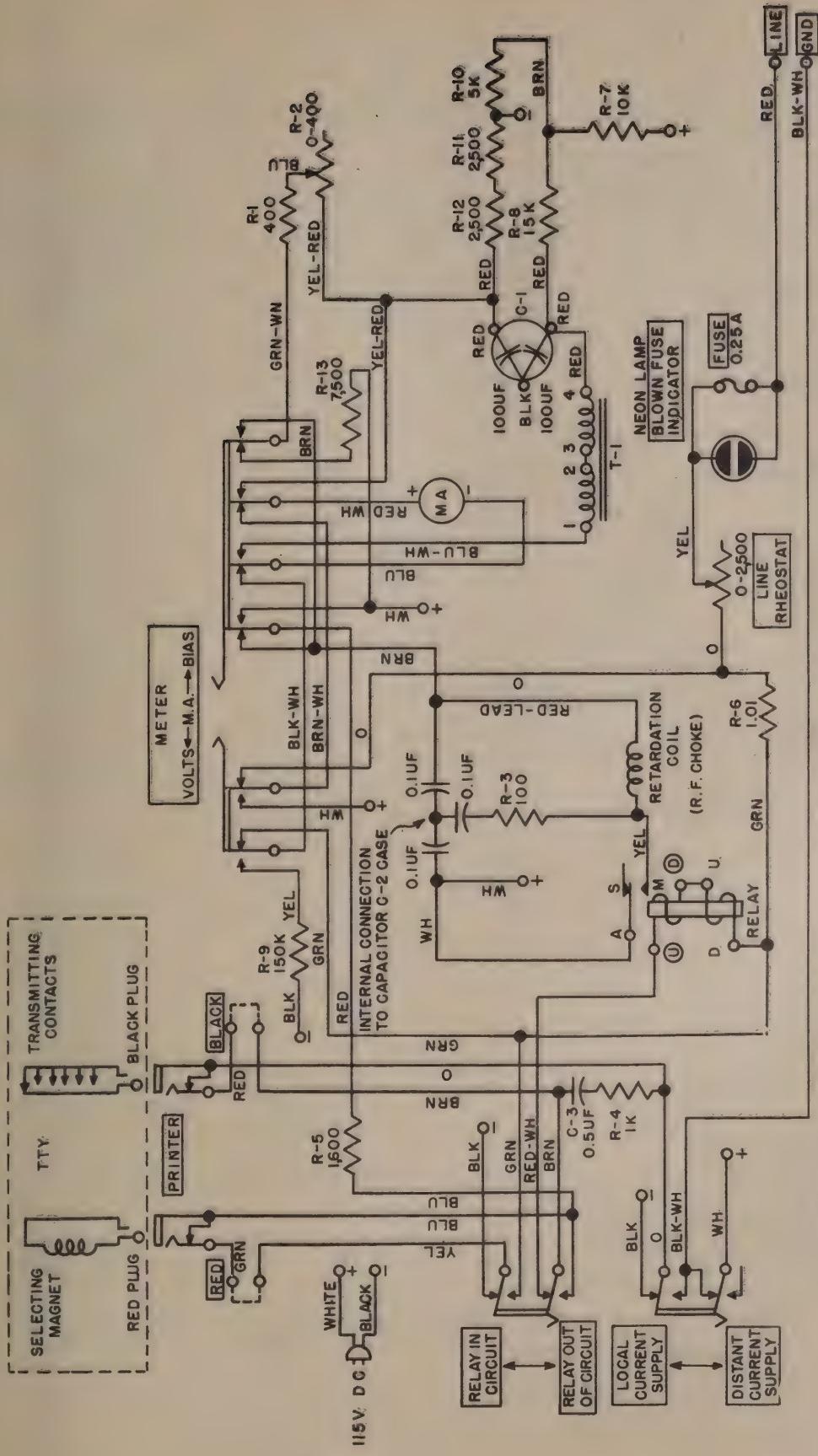


Figure 70. Rectifier RA-87, schematic diagram.

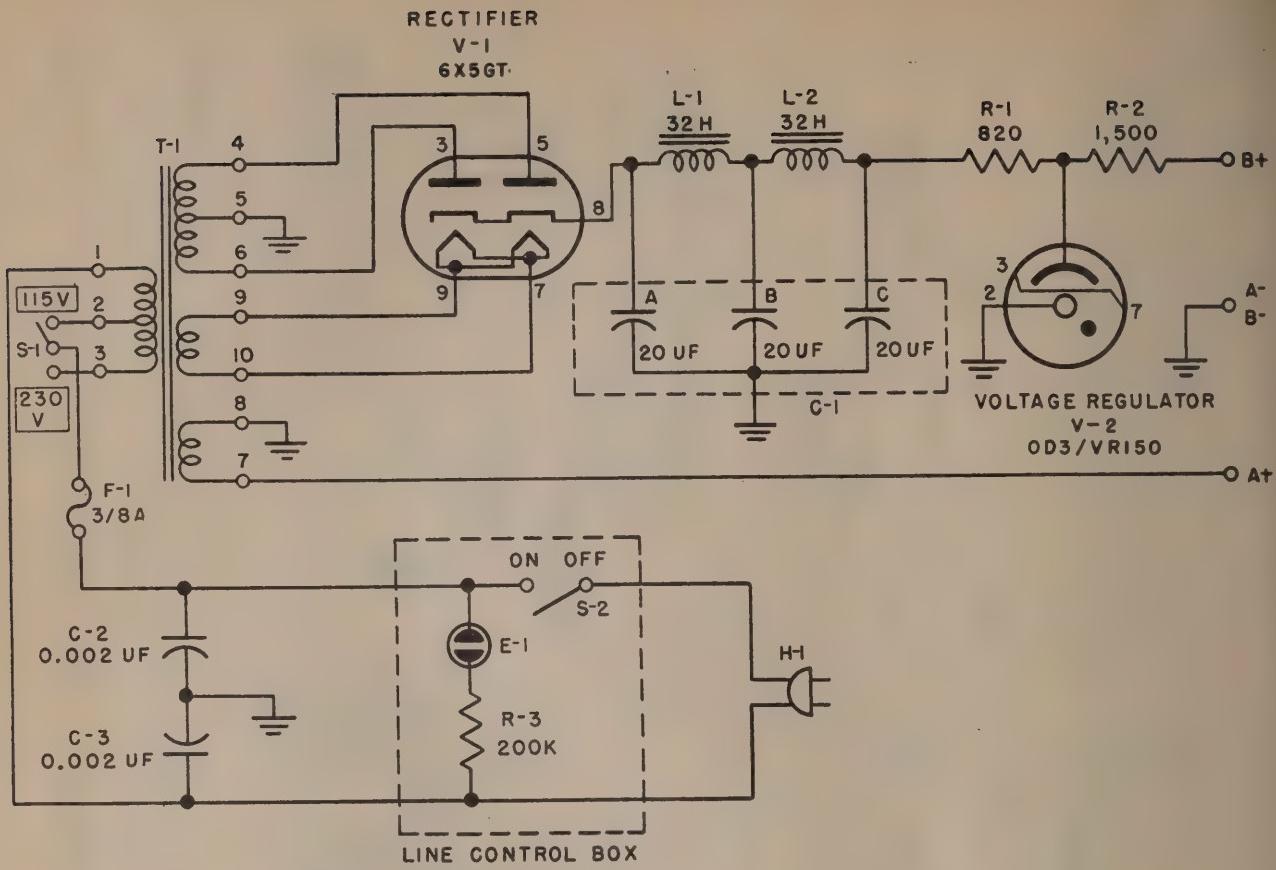
TM 264-46



NOTES:

1. ALL RESISTANCES IN OHMS.
2. S AND M STAND FOR SPACE AND MARK.
3. ALL PLUS POINTS CONNECTED TOGETHER.
4. ALL MINUS POINTS CONNECTED TOGETHER.

Figure 71. Line Unit BE-77-A, schematic diagram.

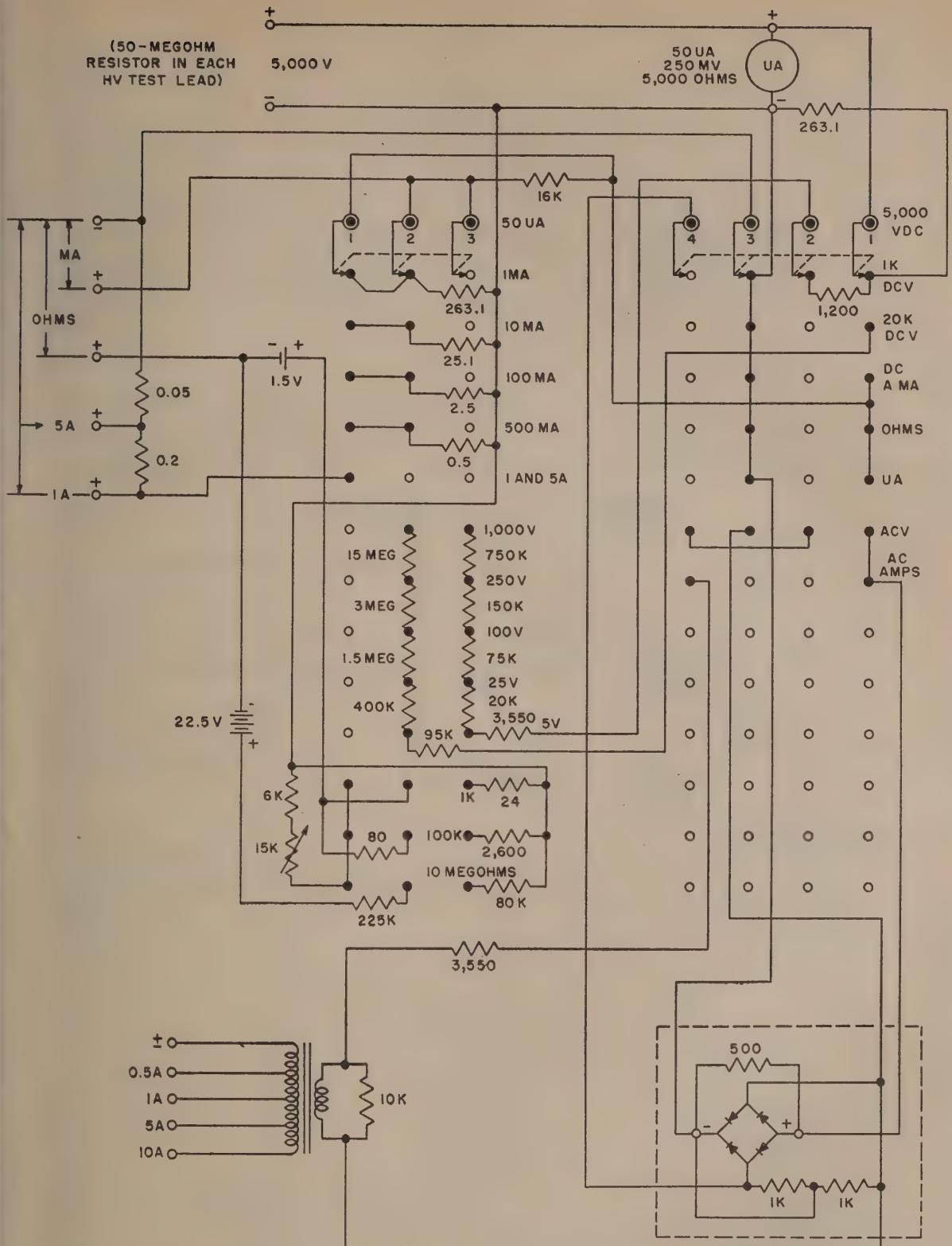


NOTE

UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS,
CAPACITORS ARE IN UUF.

TM 264-55

Figure 72. Rectifier Power Unit RA-133-A, schematic diagram.

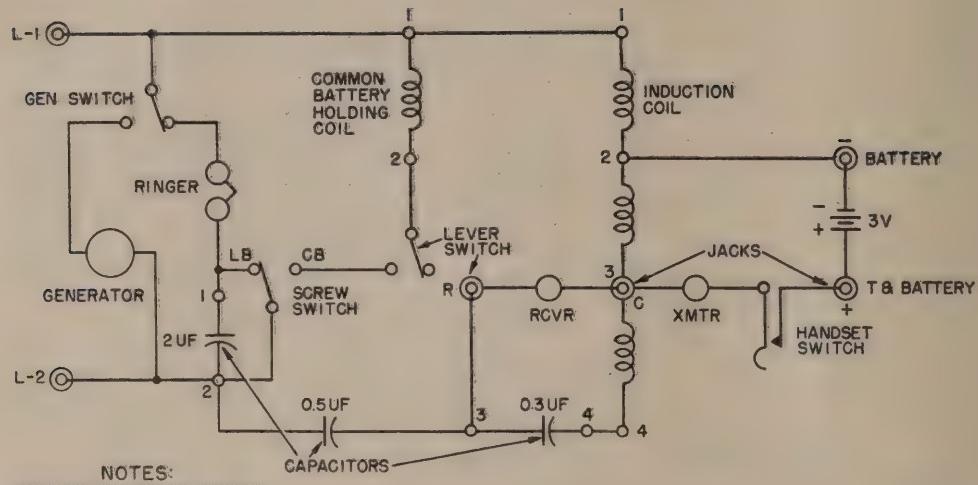


NOTES:

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS.
2. UA = MICROAMPS. MV = MILLIVOLTS.

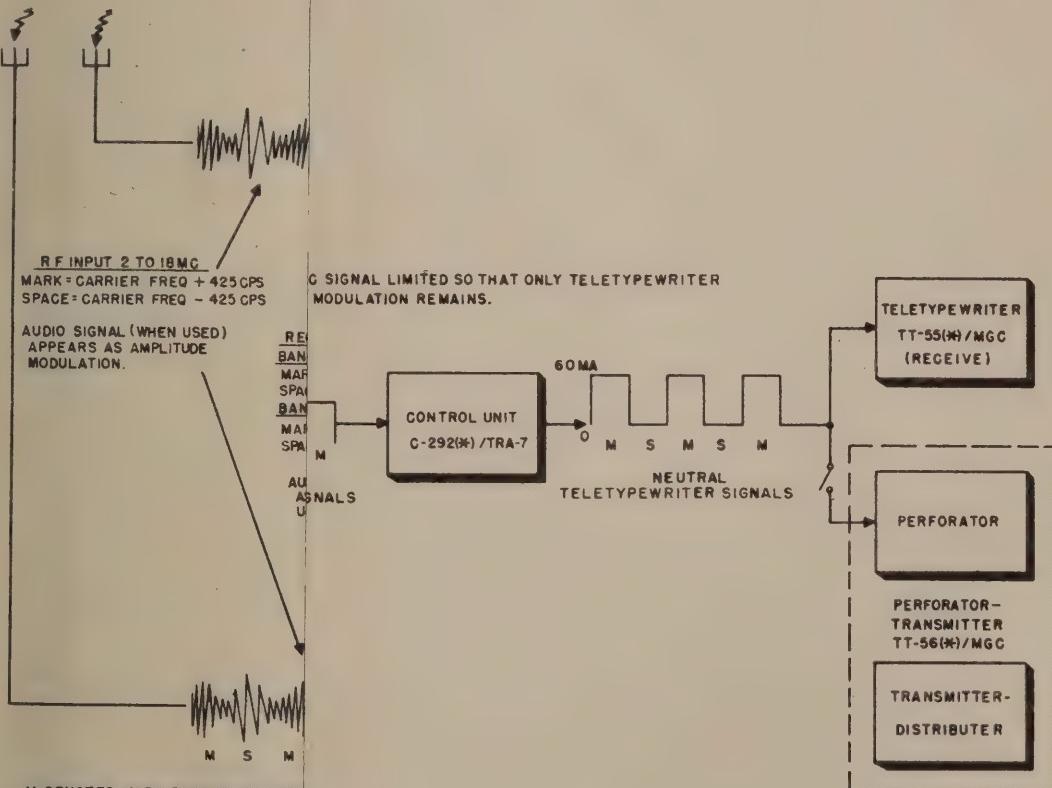
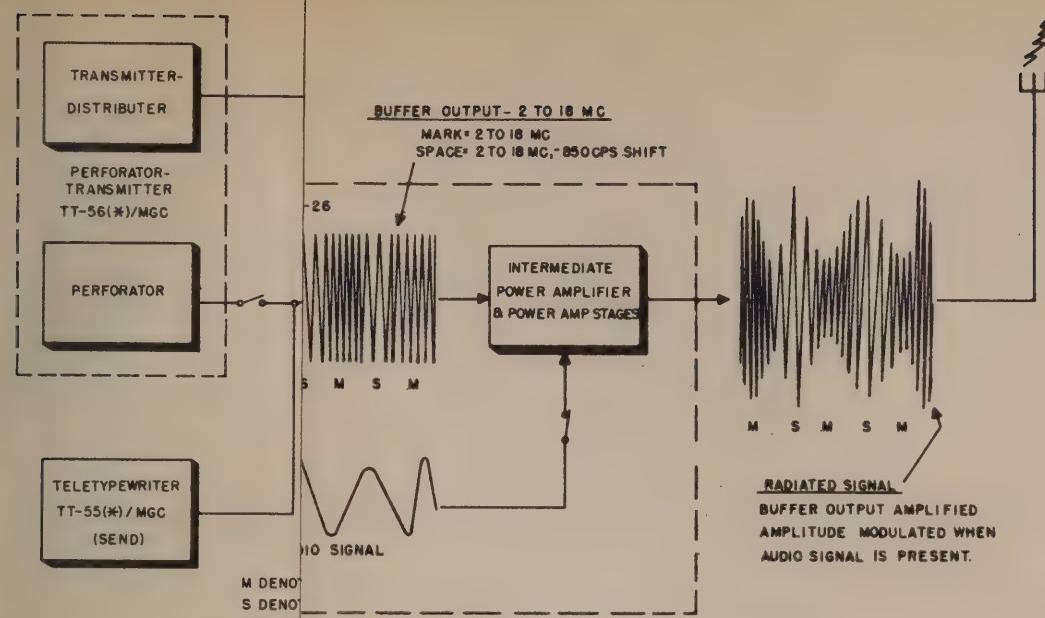
TM 264-44

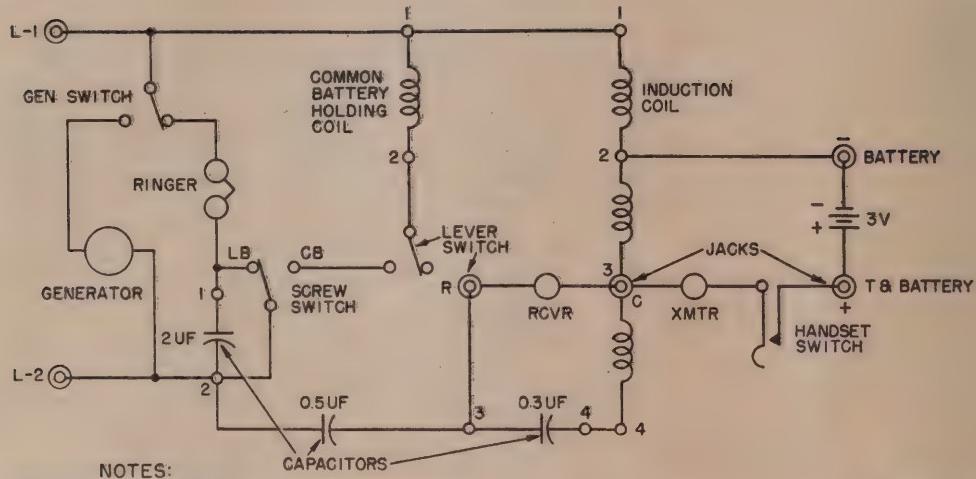
Figure 73. Test Unit I-176, schematic diagram.



TM 264-53

Figure 74. Telephone EE-8-B, schematic diagram.





TM 264-53

Figure 74. Telephone EE-8-B, schematic diagram.

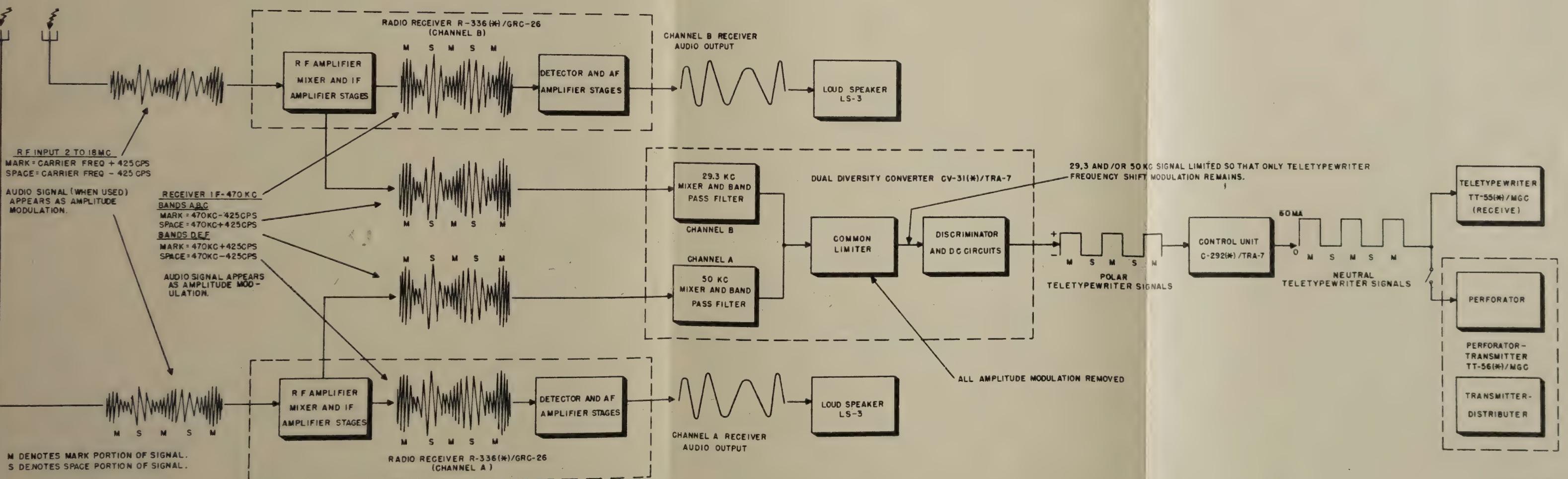
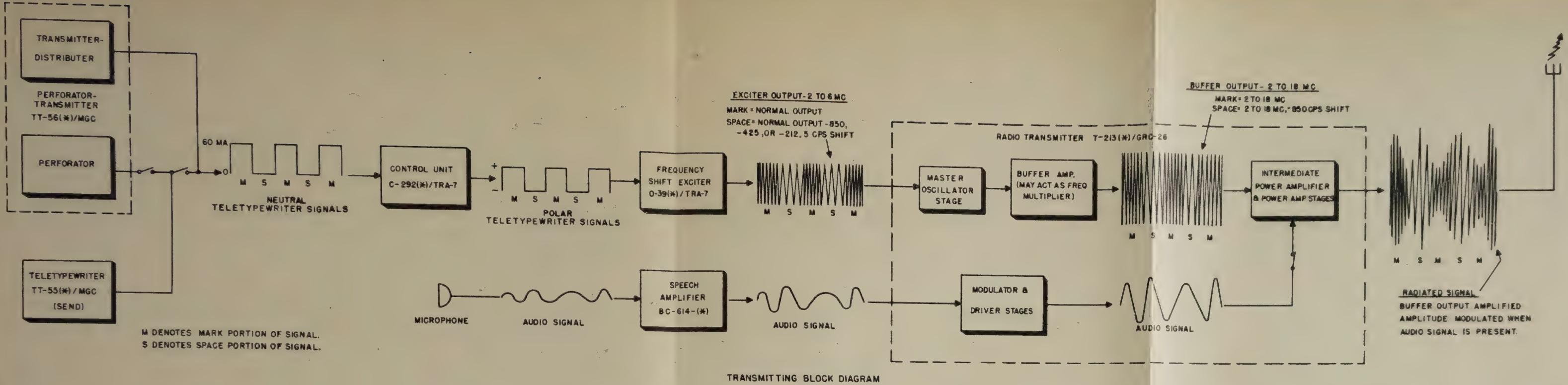
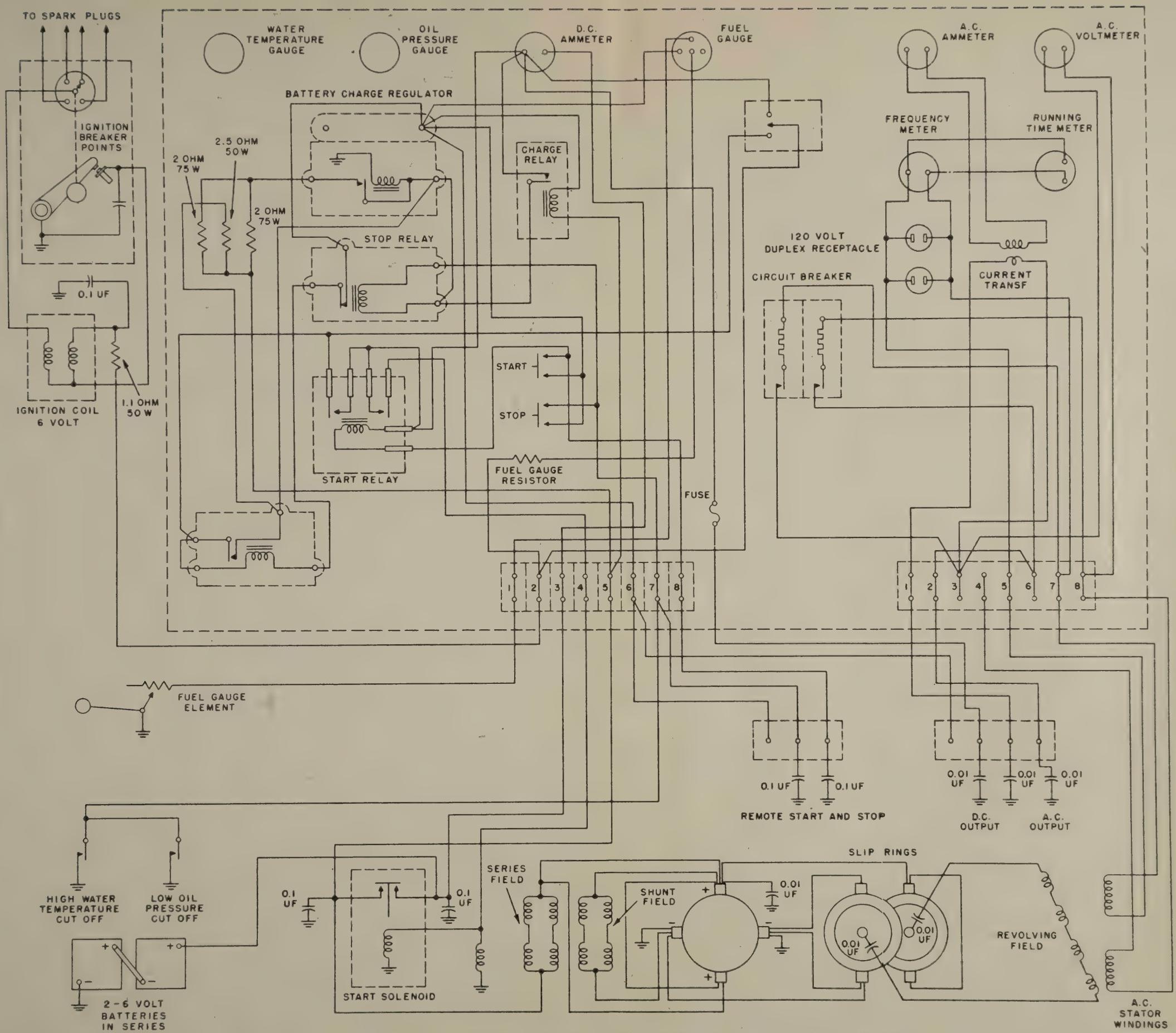


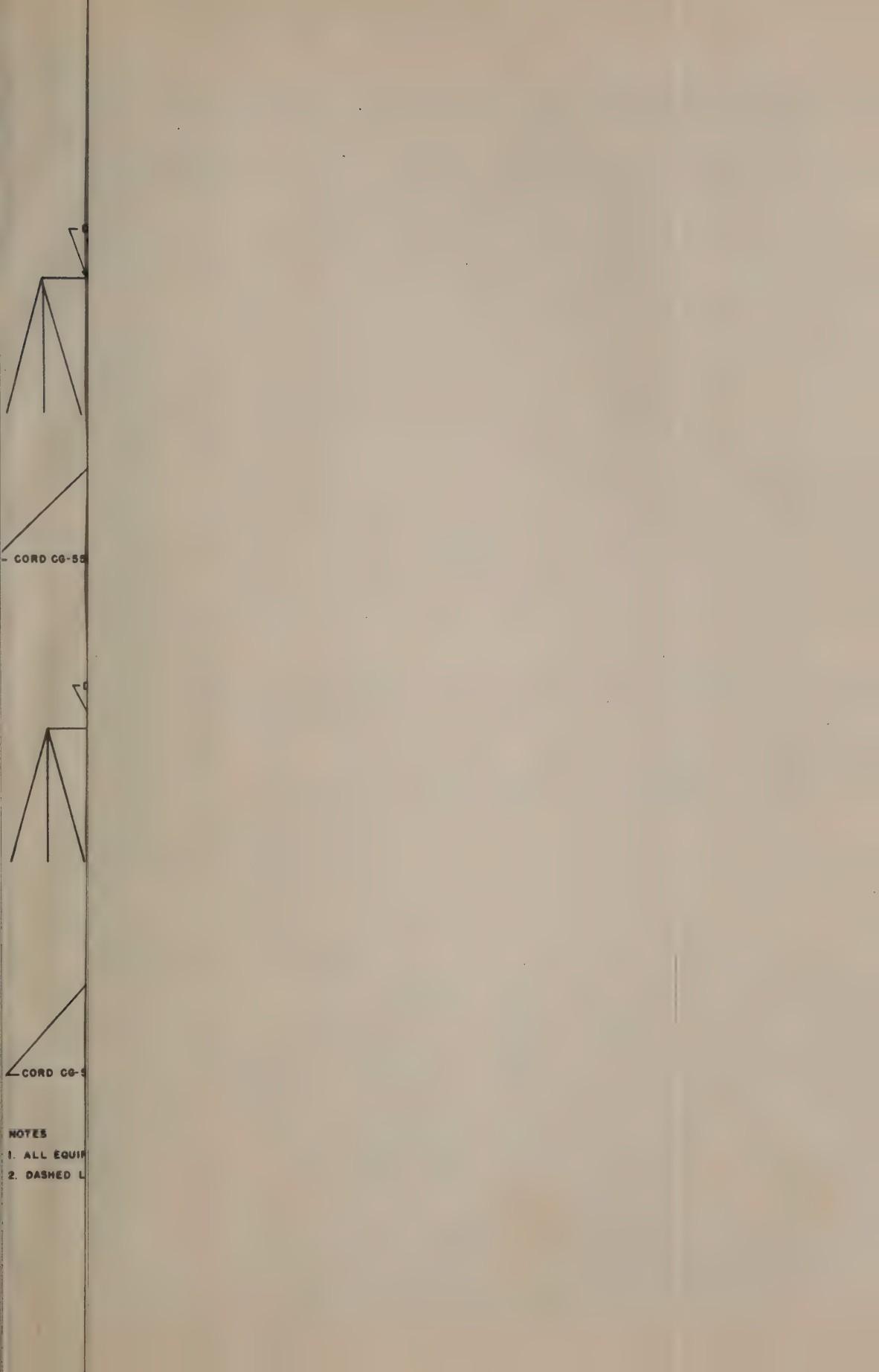
Figure 75. Radio Set AN/GRC-26, transmitting and receiving block diagram.



NOTES:

1. FOR 120 VOLT OUTPUT JUMPER 3 AND 4, 5 AND 6 ON A-C TERMINAL BLOCK.
2. FOR 240 VOLT OUTPUT JUMPER 4 AND 5 ON A-C TERMINAL BLOCK.
3. UNLESS OTHERWISE SHOWN, CAPACITORS ARE IN UF.

Figure 69. Wiring diagram of Power Unit PE-95-G.



NOTES

1. ALL EQUIP
2. DASHED L

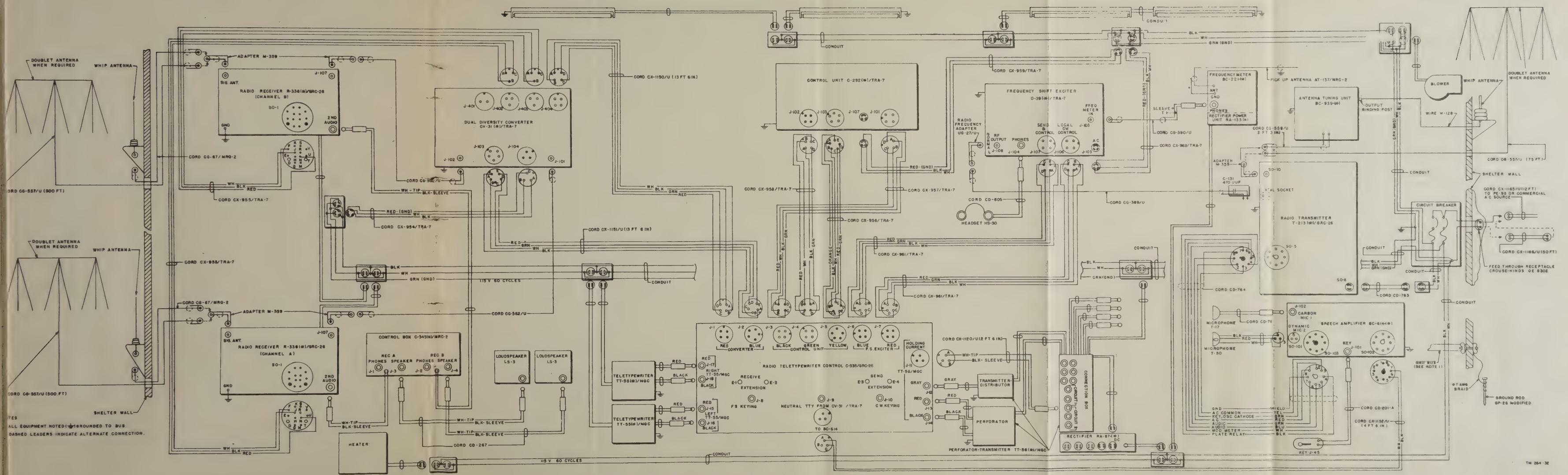
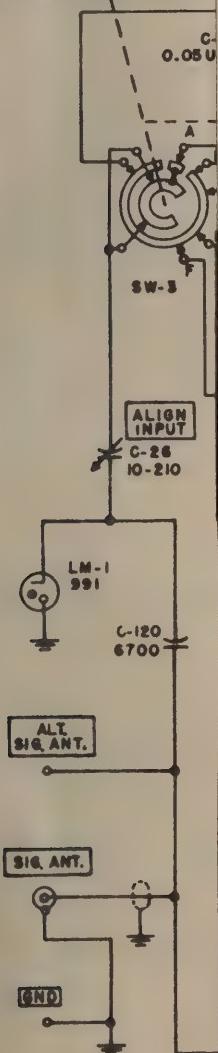


Figure 76. Radio Set AN/GRC-26, schematic diagram of wiring interconnections.

K=1000 OHMS
RESISTANCE VALUES IN
OTHERWISE SPECIFIED.
CAPACITANCE VALUES IN
OTHERWISE SPECIFIED.
NUMBERS IN PARENTHESES
REFERENCE ONLY AND
ON THE APPARATUS.

FREQUENCY --

SW POSN	FREQUENCY BAN (KC)
A	1800 - 3000
B	3000 - 5000
C	5000 - 8000
D	8000 - 11000
E	11000 - 14000
F	14000 - 18000



K=1000 OHMS

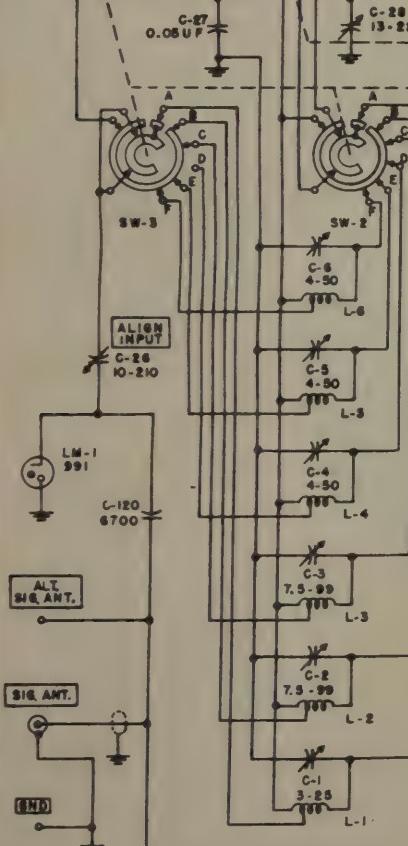
RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.

CAPACITANCE VALUES IN UF UNLESS OTHERWISE SPECIFIED.

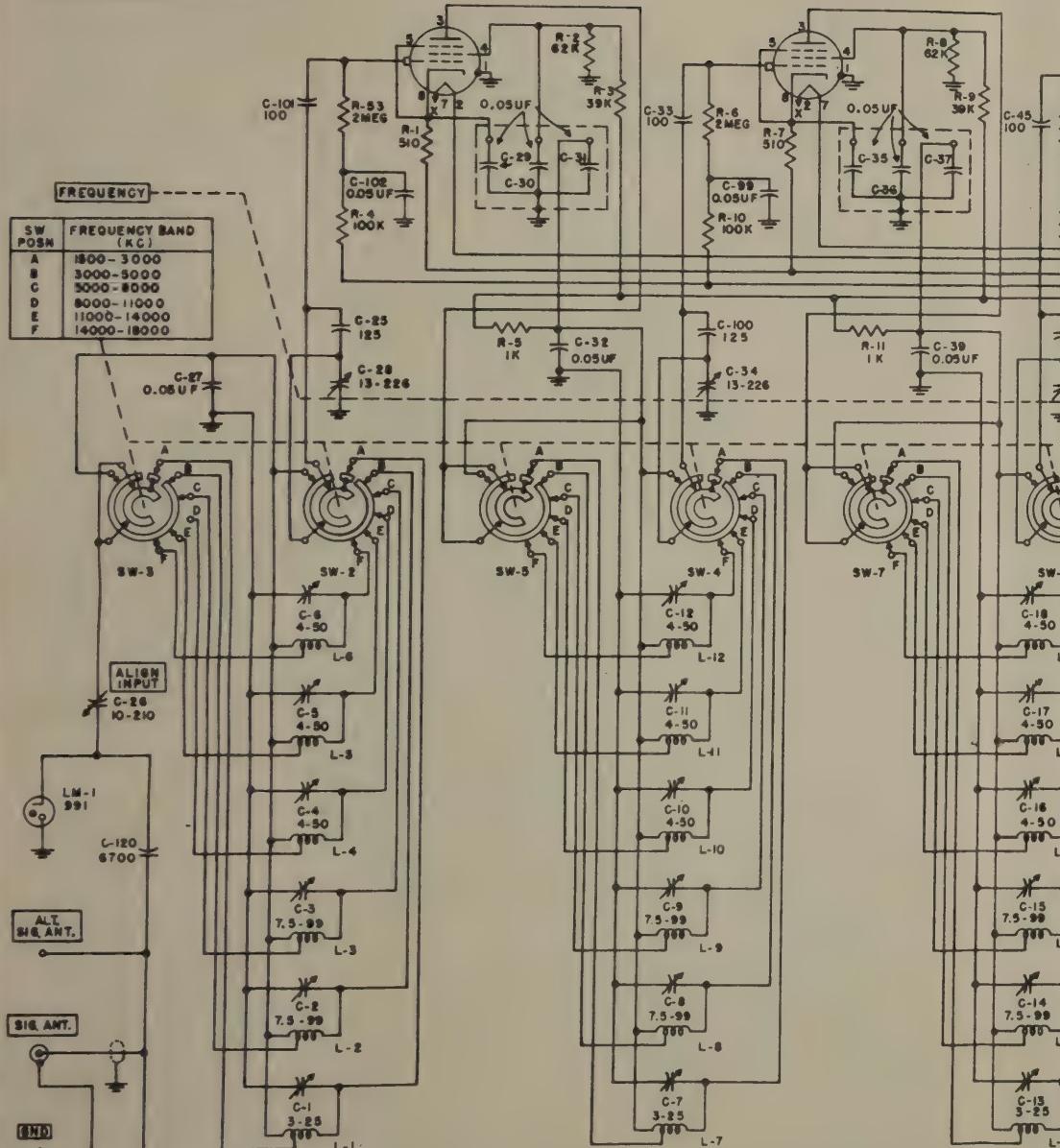
NUMBERS IN PARENTHESES ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON THE APPARATUS.

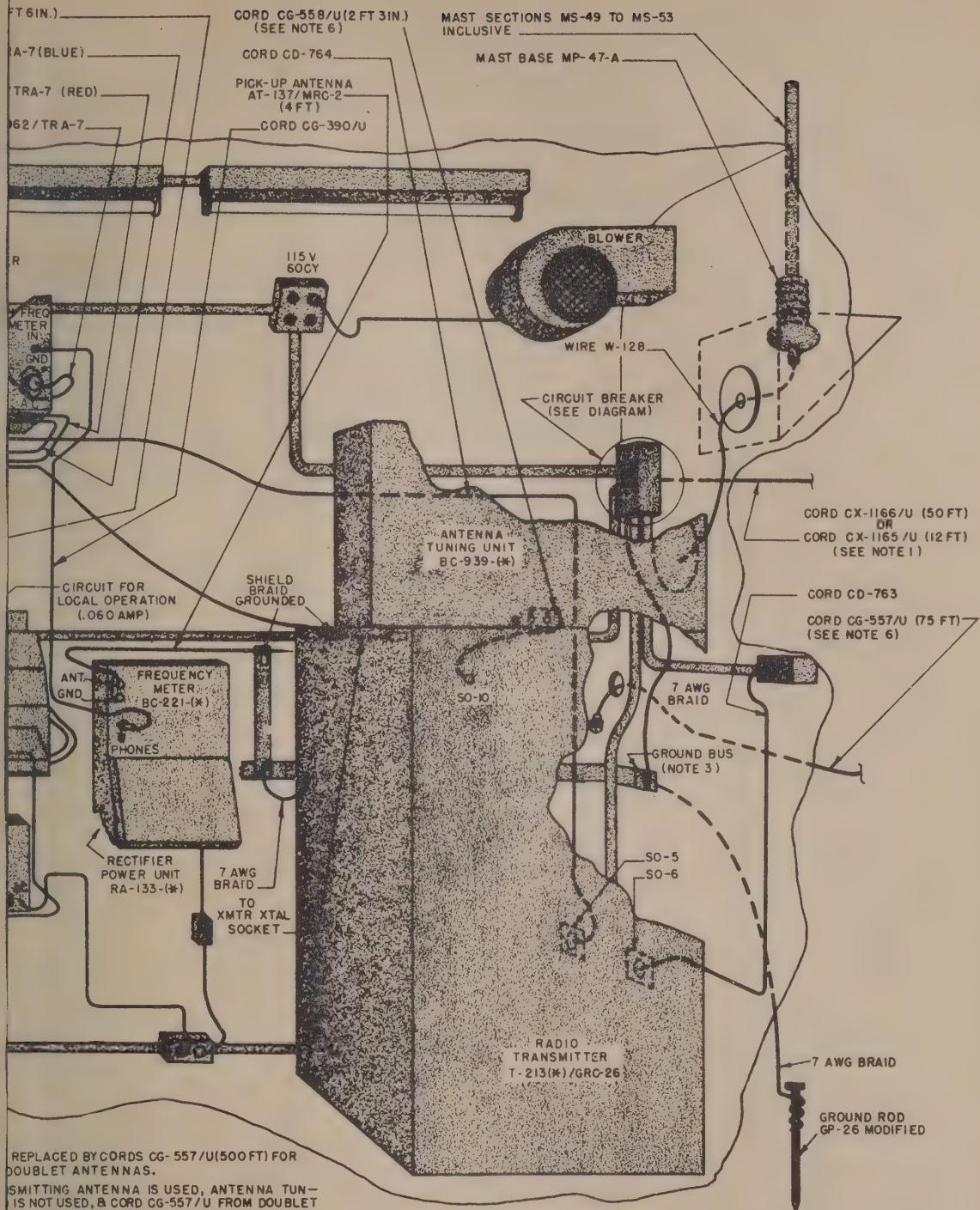
FREQUENCY

SW POSN	FREQUENCY BAND (KC)
A	1800 - 3000
B	3000 - 5000
C	5000 - 8000
D	8000 - 11000
E	11000 - 14000
F	14000 - 18000



1ST R-F AMPL

V-1
6K7



- 9 EXTENSION CIRCUITS OF RADIO TELETYPEWRITER CONTROL C-535/GRC-26 ARE USED FOR REMOTE OPERATION.
- 10 CONNECT KEY J-45 TO "CW KEYING" OR "FS KEYING" JACK OF RADIO TELETYPEWRITER CONTROL C-535/GRC-26, AS REQ'D.
- 11 THE SYMBOL (*) IN EQUIPMENT NOMENCLATURE MEANS THOSE ISSUES OF THE EQUIPMENT COVERED IN TM 11-264.

TM 264-34

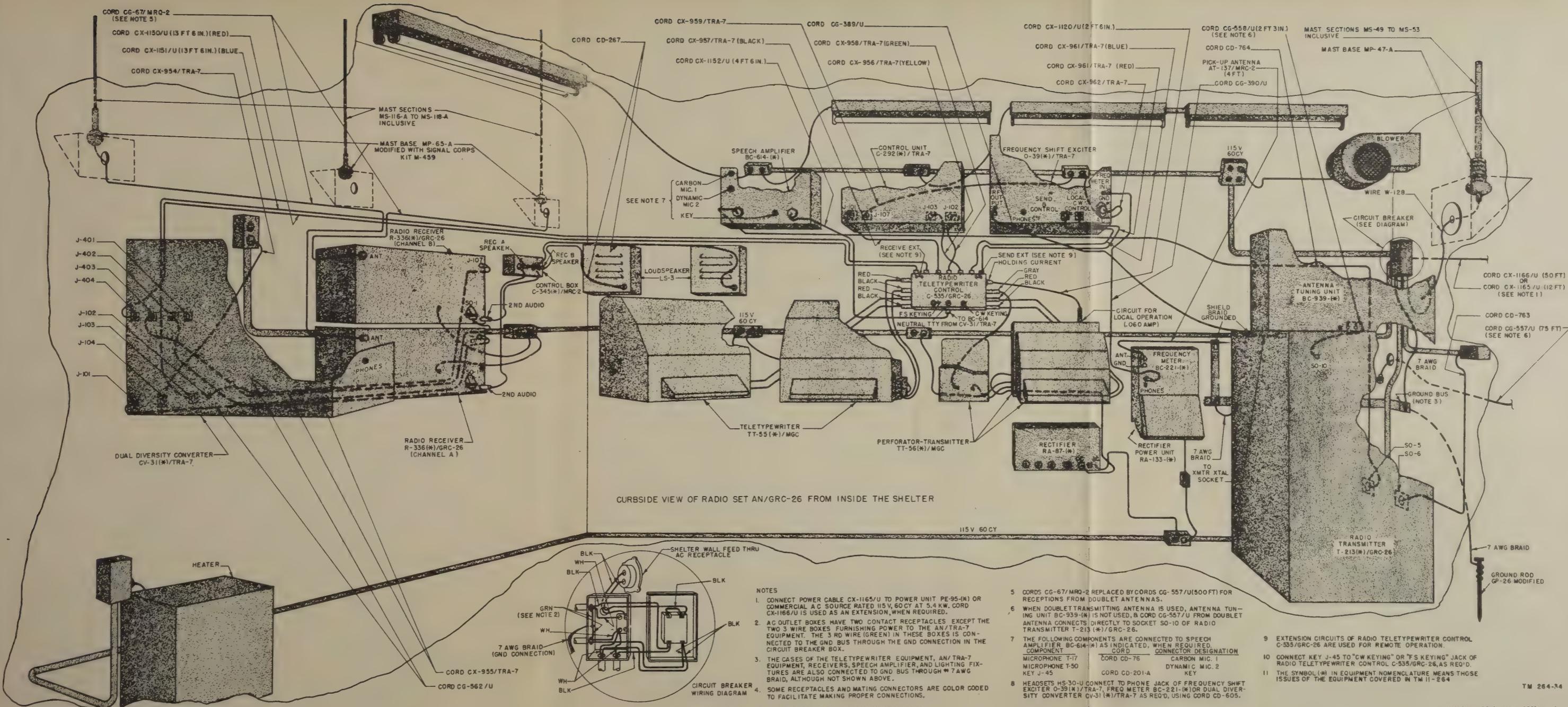
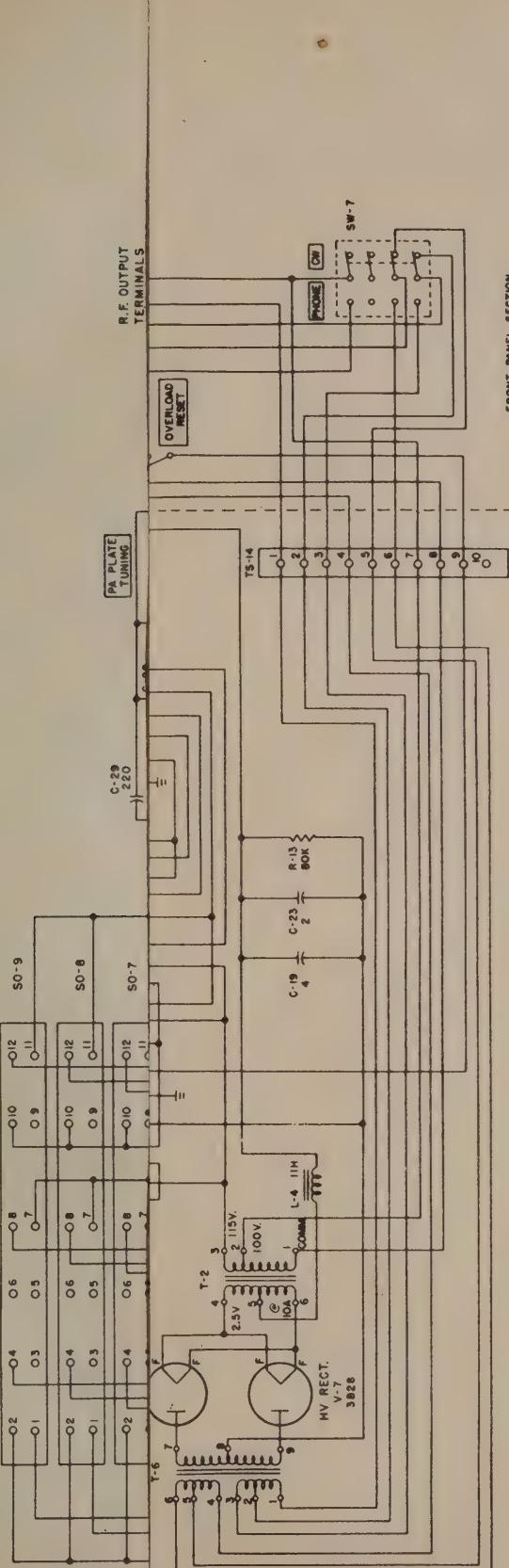
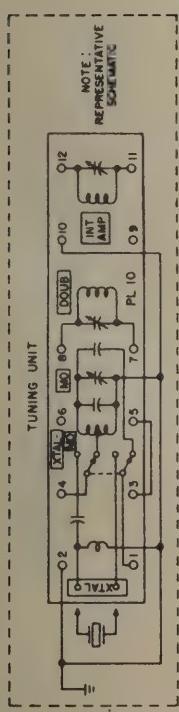


Figure 78. Radio Set AN/GRC-26, cording diagram.



FRONT PANEL SECTION

NOTES:

- 1 UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS,
- 2 CAPACITORS ARE IN UUF
- 3 C-30 IS CONNECTED DIRECTLY ACROSS M-3 IN THE F MODEL 330 K IN SERIAL NUMBERS 1 THRU 627 OF THE
- 4 C-31 IS NOT USED IN THE F MODEL
- 5 R-36 IS NOT USED IN SERIAL NUMBERS 1 THRU 627 OF THE F MODEL

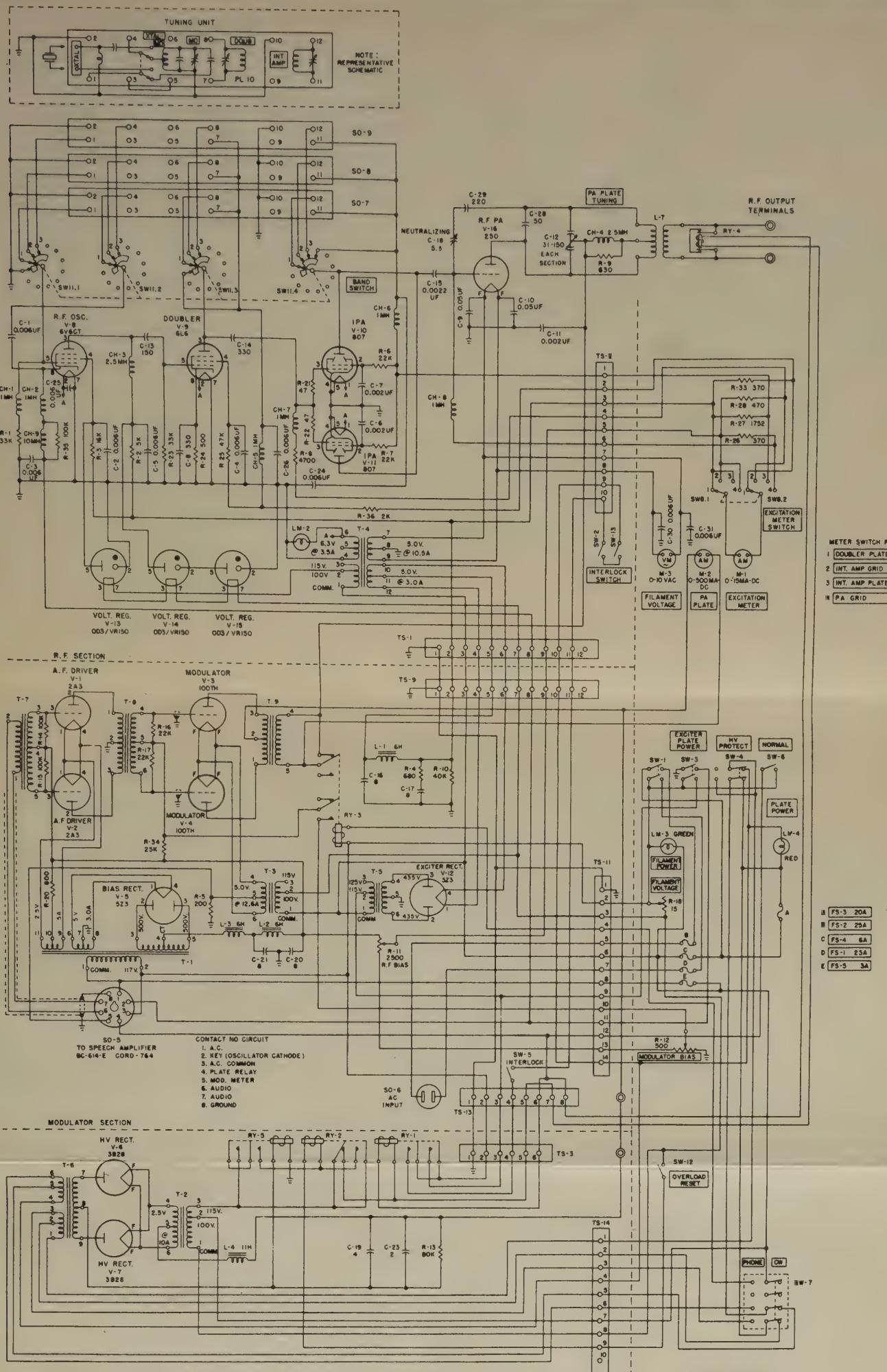
SW-7	SW-4	T-6 PRIMARY CONNECTION	T-6 SECONDARY (17-9) VOLTS
CW	NORMAL	117V INTO 1-2 PARALLEL	5160
CW	PROTECT	117V. INTO 1-2 SERIES	4-5 2880
PHONE	NORMAL	117V. INTO 1-2 PARALLEL	4-5 4800
PHONE	PROTECT	117V. INTO 1-2 SERIES	4-6 2400

M. V. POWER SUPPLY SECTION

TM 264 - 51

Figure 79. Radio Transmitters BC-610-F and BC-610-G, schematic diagram.

912606 O - 50 (Face p. 160) No. 5



BW-7	SW-4	T-6 PRIMARY CONNECTION	T-6 SECONDARY (7-9) VOLTS
CW	NORMAL	117V INTO 1-2 PARALLEL 4-5	5760
CW	PROTECT	117V INTO 1-2 SERIES 4-5	2880
PHONE	NORMAL	117V INTO 1-2 PARALLEL 4-6	4800
PHONE	PROTECT	117V INTO 1-2 SERIES	2400

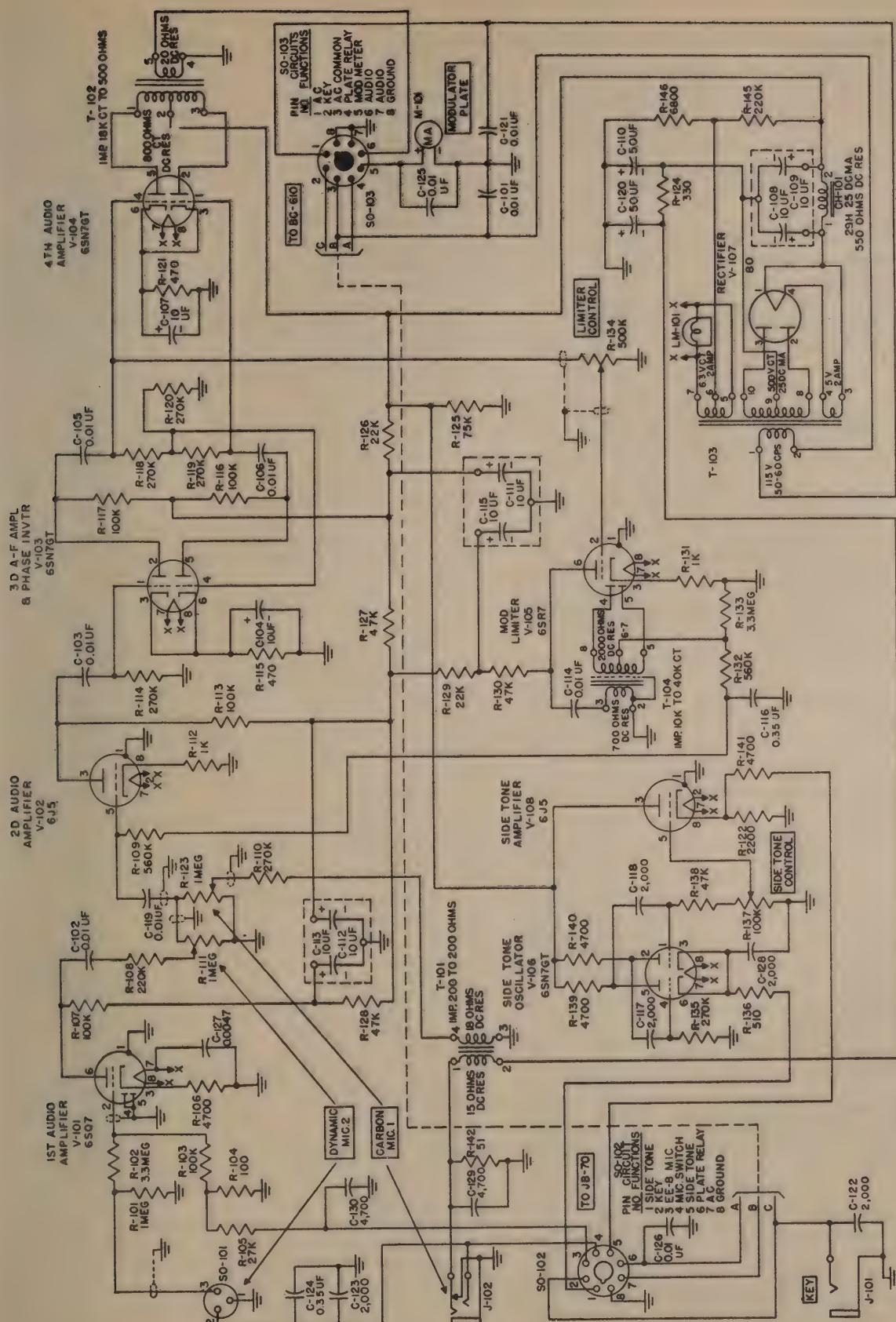
- 1 UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS,
CAPACITORS ARE IN UUF
- 2 C-30 IS CONNECTED DIRECTLY ACROSS M-3 IN THE
F MODEL
- 3 R-23 IS 330K IN SERIAL NUMBERS 1 THRU 627 OF THE
F MODEL
- 4 C-31 IS NOT USED IN THE F MODEL.
- 5 R-36 IS NOT USED IN SERIAL NUMBERS 1 THRU 627
OF THE F MODEL

NOTES

TM 264-51

Figure 79. Radio Transmitters BC-610-F and BC-610-G, schematic diagram.

912606 O - 50 (Face p. 160) No. 5



NOTES:
RESISTANCE VALUES IN OHMS UNLESS
OTHERWISE SPECIFIED.
CAPACITOR VALUES IN UUF UNLESS
OTHERWISE SPECIFIED.

Figure 80. Speech Amplifier BC-614-H, schematic diagram.

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